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Alphabetical Index to Advertisements, Page 6.

Classified Directory of Advertisers, Page 8.

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EDITORIAL

Railway Age

The Table of Contents Will Be Found on Page 5 of the Advertising Section

IMPORTANT FOR SUBSCRIBERS.—*In the interest of the conservation of paper, the Railway Age will print at the end of the present volume only a sufficient number of indexes to meet direct requests from its subscribers. Those desiring indexes should, therefore, immediately advise the New York office, 2201 Woolworth Building, New York.*

Keep the Power Loaded

One of the things needing careful watching during a period of decreasing traffic is a tendency to underload the power. In some cases such a tendency exists at all times, as is shown by the purchase of continually heavier locomotives, the potential capacity of which is not properly utilized. The possibilities for increasing the cost of operation by underloading are clearly brought out by the experience of one railroad where Mallet locomotives were placed in road service without increasing the train load in proportion to the increased tractive effort of the new locomotives. A study of the results of this operation showed a percentage increase in the amount of coal consumed on a ton mileage basis which varied directly as the increase in tractive effort per ton of train load. With the need for economy as great as it is during the present slack business period every effort should be made to keep locomotives loaded to their ratings. If traffic conditions are such that lighter trains are demanded, put the heavy power in white lead and use the smaller locomotives.

The Supervisor Should Be Out On the Line

Accounts are the bugbear of every maintenance of way officer. Because of them he is compelled to spend much of his time in the office. Unfortunately, there is no hope for any reduction or simplification of accounting. The progressive extension of the Interstate Commerce Commission's authority over the railroads has required a constantly increasing volume of records. This change has occurred so gradually that the railway managements have, in a sense, failed to appreciate the demand which the accounts make on the time of the division officer and the supervisors under his direction. A man selected because of his demonstrated ability as a field officer is only performing his function properly when he is out on the line directing the work of the field forces and using the fruits of his training and experience by passing judgment on the problems of the day. Every hour which he unnecessarily spends in the office represents a loss to his employers. The correction of this difficulty lies in the development of office organizations competent to handle the business routine and accounting with a minimum of attention by the field officer. This involves the development of engineer accountants who can be relied upon to carry on the complex accounting of the present day, while of course under all conditions the chief clerk or real business head of the office staff must be the man to take the great burden of office routine from his superior's shoulders. A thorough overhauling of the office organization will in many cases solve the problem of increasing field supervision.

National Industrial Traffic League

The National Industrial Traffic League, whose convention was reported in the *Railway Age* of November 26, page 939, is an organization of shippers. Shippers seek to get justice from the carrier, and the men at these conventions are the active agents in this matter. They have innumerable strenuous tasks. In many situations these ambassadors might seem to be engaged in actual combat with the railroad men. They do, indeed, find it necessary on frequent occasions to magnify the goodness of their own intentions and the badness of something that a carrier has done; but nothing is plainer than that these specialists perform their duties, so far as can be judged by their words and acts in their conventions, with constant dignity and altruistic moderation. Indeed, they are most favorably conditioned to deal with the railroads on a high plane of intelligent comity, for most of them were once in the railroad service themselves. They are familiar with the railroad side of every question. One who knows both sides of all the questions with which he has to deal is in position to settle such questions in the wisest possible way. This week, on another page, we give the substance of an address given before the traffic men while they were in New York by Lewis J. Spence, director of traffic of the Southern Pacific. Mr. Spence, in defining the attitude of the carriers, evinced a high public spirit. If every shipper can maintain the broad-minded public spirit manifested by the leading men in this League, and if every railroad traffic officer and agent can carry out the spirit of fairness exemplified by Mr. Spence, an immense amount of friction can be done away with—which, however, is not saying that carriers and their patrons will not continue frequently to have numerous hard nuts to crack. But is not that the kind of task which traffic men most enjoy?

Improved Versus Unimproved Locomotives

Small wonder, when we consider the large number of locomotives that are still operating without many of the most rudimentary capacity and efficiency increasing devices, that the advocates of locomotive improvement wax impatient. Are practical operating men unacquainted with the possibilities of locomotive improvements, or the bankers adamant in their refusal to advance the funds for these improvements? Perhaps the best answer to all these questions will be found in an acknowledgment of the inertia which in their inception all great movements are forced to overcome. Examples of a similar reluctance to accept improvements in other lines of industry are not wanting. But this is a great movement, nevertheless, and some day the bankers are going to get wise to the fact that the difference between modern locomotives and old locomotives may be the difference between a dividend and a deficit and that all modern locomotives do not necessarily have to be new locomotives. This is where the mechanical men can make a hit by showing the bankers how much cheaper it is to rebuild an old locomotive than to buy a new one of the same weight. By spending $22,000 on an obsolete locomotive an eastern railroad recently secured the equivalent of a new locomotive that would have cost over $50,000. While there is ample need for new locomotives,

the improved locomotive must be regarded as an important factor in any estimate of the country's future motive power requirements. The difficulty has been to accomplish enough of this rebuilding with the existing shop facilities. Now that the locomotive builders are in a position to take more work, would it not be advisable to see to what extent they can assist the railways in the modernization of obsolete power?

Passenger Service and Public Opinion

The article by William S. Wollner, which we publish on another page, is entitled to be given careful reading and serious consideration by the operating and passenger officials of the railways. Mr. Wollner is a railway man himself, but made the observations of railroad passenger service, which he records, as a passenger traveling in the ordinary manner. The *Railway Age* believes that however justifiable they were, the advances recently made in passenger rates and the surcharge added to sleeping car rates have caused more feeling and adverse criticism on the part of the public than the advances in freight rates, although the advances in freight rates will cost the public almost four times as much. The freight rate reaches the consumer only indirectly. The passenger charge is paid by him directly and therefore he feels an advance in it far more. Also, it should never be forgotten that the number of people who come in direct contact with railway passenger service, and who are irritated by its shortcomings or pleased by its good qualities, is far larger than the number who come in direct contact with freight service. Therefore, delayed trains, uncivil ticket agents and train employees, poor meals on dining cars, petty grafting by employees in the sale of sleeping car space, and so on, are adapted to cause even more public sentiment against the railways than poor and inadequate freight service. The less the railways think about merely competing with each other, and the more they think about giving all their passengers, on branch as well as through lines, and at non-competitive as well as competitive points, service devoid of irritating shortcomings, the better the effect upon public opinion will be.

The Express Consolidation

The Interstate Commerce Commission, in a decision abstracted elsewhere in this issue, has approved the consolidation of the express business in the hands of the American Railway Express Company and has given its sanction to the elimination of competition as developed by the four former operating companies. This case is an interesting working out of one of the elementary factors of the study of the subject of economics. The case that is ordinarily used in the teaching of that subject is the milkman, but the expressman supplied as good an example. The wagon routes of the several express companies duplicated and tripled each other and crisscrossed each other at all points. There was thus a great economic waste that has now been eliminated by having routes for but a single company. The consolidation of the express companies, once the new company is operating at its expected efficiency, should enable us to have a good service fully on a par with the service that was supplied formerly by several companies. The elimination of competition in any business may be a handicap to the conduct of the business. The difficulty, however, seems to have been that competition in the express business was not all that it should have been. Particular reference might be made to loss and damage and to claims. The commission in its decision uses these words: ". . . the methods of the Adams and Southern express companies in the settlement of claims against them merit the severest condemnation. . . ." This failure to pay claims for loss and damage was brought to the attention of too great a proportion of the American people to have impressed them with the value of competition in the express business. It might be added that it is the opinion of altogether too many people who have tried to collect such claims that the failure to give proper attention to claims was almost a national scandal and a real disgrace to American business ethics and courtesy.

Conserving Cash and Lumber

Neither the magnitude of lumber purchases in comparison with other items of material nor the importance of the savings that can be effected by the use of inferior grades are fully appreciated by all railroads. The following is quoted from a paper presented at a recent meeting of the Forest Products section of the American Society of Mechanical Engineers:

"In the early days when the supply of wood in this country was thought to be inexhaustible, clear grades of wood were generally demanded by the car builders, and in the construction of new cars this is generally the practice at the present time, especially for car roofing and siding—sound-knotted stock being used for decking and lining. Some of the more progressive railroads, however, have gone a step further in recent years and many are now using sound-knotted stock for siding and roofing for repair and maintenance work. There is no doubt but what such a practice is economical and based on sound judgment, for certainly there is no necessity for using clear material for the repair of many classes of freight equipment, the life of which may not be in excess of seven to ten years. One large railway system which not only constructs its own cars but does repairing on a large scale, has adopted a practice as to grades which has resulted in a saving to this railroad of over a half a million dollars per year."

Lumber is certain to increase rapidly in price as the available supply approaches a state of exhaustion. This is best emphasized by the fact that approximately one-half of all the available timber in this country is now located in three states bordering on the Pacific ocean. A survey of the records showing the annual rate at which lumber is being consumed in this country is even more startling. As a result of this situation, the railroads are already using grades that not many years ago were thought impossible and within an equally short period, it will obviously be necessary to specify grades of lumber for cars and other structures that are now regarded as unfit for this use. But, this being a fact, why should the railroads not anticipate this situation; particularly if the use of a slightly lower grade of timber at this time will reduce the cost of this lumber and assist in the conservation of one of our most valuable natural resources?

One of the Sore Spots

When it comes to buying coal a great many railroad men, particularly those in the mechanical department, have the idea that a purchasing agent would accept cobble stones painted black if offered at a lower price. Something should be said, therefore, for the purchasing agent of a northern railroad who, facing a winter with depleted stocks, has deliberately rejected 400 cars of inferior coal, many of which he personally inspected. A coal trade journal that has always regarded the railroads as the trade's worst enemy, has accused the purchasing agent of acting to relieve the railroad of some high priced coal in a falling market, but these comments may be ignored in view of a report submitted by the expert for the coal company in which many of the cars were frankly described as *unfit for any use whatever.* One of the compensations for the trying conditions imposed by the

economic readjustment now under way is the gradual alleviation of some of the sore spots that have been aggravated by conditions immediately following the war. Of these none has caused greater distress than the abominable character of coal that many railroads have been forced to accept as locomotive fuel. The inefficiency of a mechanic may be evidenced by a lessened output, but the inefficiency of a miner usually results in an increased output of coal in which there is a large percentage of every impurity to be found in the mine. Operators with a reputation to sustain have generally clung to some standards of quality, but many operators have sacrificed everything for quantity, knowing that the railroads, in their dire need for fuel, must accept anything. Where the coal was so bad that it would be rejected even under these circumstances, cars have been covered with a thin veneer of respectable coal to hide the inferior contents. It is safe to say that the fancy prices paid for coal within recent months have not cost the railroads half as much as the enormous tonnage of unburnable matter hauled from the mines to the coal chutes, loaded onto locomotive tenders, and either thrown on the right of way or eventually dumped in the ash pit after causing endless locomotive failures.

How Can Collisions Be Prevented?

The collisions in Oregon, Iowa, Missouri, Vermont and Illinois, referred to in our editorial of October 1, page 553, constitute a reproach to American railroad practice—a scandal. In commenting on them we observed that the railroads, by their action, dissented from the governmental view that, as a preventive of such collisions, the block system ought to be introduced everywhere on passenger-carrying lines. James B. Latimer, signal engineer of the Chicago, Burlington & Quincy, whose letter is printed in another column, thinks that this is too severe on the railroads. "Scandal" is, indeed, a severe word; but it is a serious situation that we are dealing with. Will any officer of any road involved say that he is not deeply chagrined at the record here cited, so far as it concerns the collision on his particular road? In the list of prominent collisions that occurred in a period of five years, on lines ostensibly equipped with the manual block system, which was presented by W. P. Borland in the *Railway Age* of July 16 last, we find the names of 25 prominent railroads. Are we wrong in assuming that the railroads generally ought to be made "respondents" in any inquiry concerning these grave lapses from safe practice? The only real difference, we imagine, between Mr. Latimer and the *Railway Age* is in regard to the point of view. He speaks of automatic block signals as the only up-to-date means of maintaining a space interval between trains. That, however, is only a partial statement. Passengers expect to ride in safety on roads too poor to install automatic signals. In our comments (as well as in those of Mr. Borland) the primary postulate was that some means of enforcing a space interval rule ought to be adopted on even the railroad with the lightest traffic. We spoke of the railroads' position as indicated by their action. By their words they adopt the (manual) block system on thousands of miles of lines not deemed important enough to need automatics. By their action the system is so loosely managed or so very freely suspended that the practice cannot fairly be called the block system. That five-year list of examples has to do mainly or wholly with lines on which the block system was ostensibly in use but in reality was not in use. A strictly managed manual block system would have prevented, probably, 95 per cent—perhaps 100 per cent—of those collisions. Such a manual system may not be entitled to be called "up-to-date"; but, with it, the road which cannot find money to buy automatics can at least say that its practice is as nearly up-to-date as the officers are able to make it. That cannot be said of these roads which figure in the collision records—nor of the innumerable other roads whose practice is no better than that here exposed.

Is There an "Irrepressible Conflict?"

THE RADICALS who expound extreme theories of socialism and bolshevism contend that there is an "irrepressible conflict" between capital and labor which can only end when working men have been reduced to practical slavery or the system of capitalism has been destroyed.

Developments within recent years in the railroad and other industries in this country might be used as arguments in support of this view. The demand for labor long exceeded the supply, and labor, especially organized labor, used its advantage ruthlessly. It forced wages up and hours of work down, secured unreasonable conditions of employment wherever it could, reduced its efficiency, and assumed an attitude of bullying never surpassed by the most arrogant employer.

Since the demand for labor began to be greatly reduced a few months ago employers in many lines of business have begun to use with equal energy, and in some cases with equal ruthlessness, the advantage the change has given them. In many cases the policies adopted have apparently been intended to "smash" the unions. The provocation labor unions have given within recent years has been great, and it is not surprising that many employers who formerly were friendly to them have been rendered hostile.

It is obvious, however, that, if in every period when the demand for labor exceeds the supply organized labor is going to use and abuse its power to the utmost, and if in every period when the supply of labor exceeds the demand employers are going to use and abuse their power to the utmost, the bitterness that exists between employers and employees will be intensified and they will be perennially engaged in conflicts which will harm both them and the public.

One of the principal causes of these struggles is that there is something more involved than a mere settlement of economic issues. This is conspicuously true in the railroad industry. The railroad labor organizations have constantly been striving to increase their power. They broadened their movements for higher wages and easier conditions of employment from local to national movements. Then two or more unions began to unite in national movements, and at the present time they have what amounts to a federation of all the national railroad labor organizations. Their purpose apparently has been to form a federated organization which would have so much power that the railway companies and the public would not dare oppose its demands to the point of risking a strike. With this power in their hands the labor leaders apparently have thought that they could get anything they might want.

The railway managers are anxious to increase economy and efficiency of operation. The public demands that they shall do so, and they must do so to enable the roads to earn adequate returns. The railway managers know that efficiency and economy cannot be substantially increased without either an increase of the efficiency of labor or a reduction of wages. They know that the power of the labor organizations has been used to secure the abolition of the means by which the efficiency of labor has been stimulated in the past, and to prevent the adoption of means by which it might be increased in future.

It is not surprising, therefore, that the railroads and other employers regard increases in the efficiency of labor and increases in the power of the unions as incompatible, and are opposed to all measures which are demanded by the unions for the obvious purpose of increasing their power.

So long as labor organizations continue to give employers and the public reason for believing that every increase in the power of the organizations will be an obstacle to the increase of industrial efficiency, the opposition of employers and the public to measures that will increase the power of the labor unions will grow greater.

But why have the labor unions always used their power to extort rules and conditions of work which have tended to reduce efficiency? Partly because, according to the superficial and fallacious economic philosophy of many of their leaders, the less work is done by each man the more there will be to do. Partly, also, because their leaders and members have believed that many efficiency methods favored by employers have been designed not merely to increase the efficiency of labor, but to break down the unions. As long as the unions use their power to destroy methods that will maintain and increase efficiency, and as long as employers use efficiency methods to break down the unions, the conflict between the unions and the employers will continue.

Theoretically, however, it is easy to see how the conflict might be stopped. It is conceivable that in any industry—the railroad industry, for example—representatives of the unions and representatives of the employers might in conference work out measures for increasing the efficiency of labor, and co-operatively adopt and carry them out.

Utopian as this plan may seem, it appears to be the only one the adoption of which will ever stop the conflict between capital and labor, or prevent it from growing fiercer. Labor organizations will always oppose every means which may be proposed for increasing efficiency if they believe one of its purposes is to break down the unions. Employers always must, as matter of self-preservation, struggle to increase the efficiency of labor, and therefore always will and must resist every effort to increase the power of the labor unions as long as they believe that the increased power will be used to reduce efficiency.

Hearings are to begin soon before the Railroad Labor Board upon the question of perpetuating the national agreements made by the Railroad Administration and some of the railroad labor organizations. Conferences are also to be held by representatives of the employees, representatives of the railways and the Railroad Labor Board regarding the establishment of national boards of adjustment.

The major premise from which all sound reasoning regarding the railroad labor problem must start is that measures must be adopted which will increase the economy and efficiency with which the railroads are being operated. Another premise on which all sound reasoning regarding the railroad labor problem must be based is that the present labor costs of the railroads are too high and must be reduced. Every kind of cost that enters into operating expenses—fuel costs, material costs and labor costs—must come down. The inevitable conclusion is that either the efficiency of railroad labor must be increased or its wages must be reduced.

The managers of the railways contend that with the national agreements now in effect, which require the railways to pay out millions of dollars annually in wages for work which is not done, and which compel them to promote and lay off men, not according to their merits but according to seniority, the efficiency of labor cannot be adequately increased and labor costs cannot be adequately reduced. They maintain that the perpetuation of national agreements and the creation of national boards of adjustment will greatly increase the power of the labor unions, and that their increased power inevitably will be used to prevent increases of efficiency.

It is useless for the representatives of the labor unions merely to reply that the national agreements and national boards of adjustment are needed to protect the members of their organizations. The public is very tired of increases in the power of labor organizations which are secured ostensibly for the protection of their own members, but which are used mainly to enable their members to exploit the public through increased wages and less work, as has been so conspicuously and notoriously the case in railway shops, for example.

The *Railway Age* is not in sympathy with some of the extreme "union busting" methods which are now being used by many employers. We do believe, however, that, in the public interest, either the power of many labor organizations must be broken or the unions must begin to use their power to promote the public interest by helping to secure increased industrial efficiency. The most effective means the labor unions could use to secure a continuance of the present high wages and favorable conditions of employment would be to use their utmost endeavors to get their members to increase the efficiency of their work in proportion to the advances in their wages. If there should be great increases in the efficiency of railway labor the present freight and passenger rates might be proved adequate, or might even be reduced, without reductions of wages. But no increase in power which the railroad labor unions ever can get will make it practicable to maintain present railway wages and working conditions without a very great increase in the efficiency of railway labor.

If there is an "irrepressible conflict" on the railroads or elsewhere between labor and capital, it is between those who are determined to increase the power of the labor unions and the inefficiency of their members, and those who are determined to increase industrial efficiency and to prevent every increase in the power of the unions which is used to reduce industrial efficiency. In such a struggle the public will be forced, for its own protection, to side with the employers. In the long run if the labor unions do not use their power to increase the efficiency of their members, their power will not only cease to be increased, but will be greatly reduced, if not actually destroyed.

Are Car Conditions Improving?

JUDGED SOLELY by the trend of the percentage reported in bad order the condition of freight cars is worse now than at the expiration of government operation, and the car departments have failed to carry out their part of the campaign for improved service inaugurated early in the summer by the Association of Railway Executives. An analysis of such facts as are available, however, does not justify this conclusion. Following the inauguration of the executives' campaign the first report available, that covering the first half of the month of July, showed that there were 176,672 freight cars in bad order, or 7.6 per cent of the 2,330,780 cars on the lines of Class I railroads. While the latest report, that for the first half of the month of November, shows an increase of 0.1 per cent in the proportion of bad order cars, the actual number in bad order was 2,400 less than shown on the July 15 report. During this period the per cent of cars on home lines had increased from 26 to 32.5 while cars on their home lines had increased from 57 per cent of the total number of bad order cars to 67.6 per cent, indicating clearly that there had been an extensive movement to the home lines of cars needing repairs.

This movement was essential before any permanent improvement could be made in the average serviceability of the freight car equipment of the country. The effect of this increase in the proportion of bad order cars on home lines is partially reflected in the changed ratios of those needing light repairs and those needing heavy repairs. While the total number in bad order decreased only 2,400 in the period from July 15 to November 15, there was a decrease of over

8,000 in those requiring light repairs, but an increase of nearly 6,000 in the number of cars which are held requiring heavy repairs.

There has been a material improvement in the condition of open top cars; 5,300 less of them were in bad order on November 15 than on July 15, the difference being approximately evenly divided between lights and heavies. Although there was, during this period, a reduction in the total number of these cars, there was an actual net increase of about 1,200 in the number actually available for service. While the number of box cars needing light repairs decreased over 3,000, there was an increase of about 8,000 in the number requiring heavy repairs, which was partly accounted for due to an increase in the proportion of bad order cars on home lines to the total number of cars in bad order, from 46.5 per cent to 63 per cent.

It is unsafe to assume that these changes in the bad order situation are due entirely to the extent to which advantage has been taken of the increasing homeward movement, because the sharp decline in traffic and the reduction of working forces doubtless have tended to cause an accumulation of cars needing heavy repairs, but these factors have not prevented an actual increase in the number of serviceable gondolas, in the face of a decrease in the total number of these cars. This marks a definite accomplishment, and before final judgment can be passed on the efforts of the car departments time must be allowed to determine what advantage will be taken of the present opportunity to effect a permanent improvement in the box car situation. Box cars needing repairs are now on the home lines in large numbers; material and labor to make the repairs can be secured. Will the railroads lose the opportunity presented because of drastic curtailments of maintenance expenditures?

New Books

Practical Locomotive Running and Management. By W. G. Knight, 519 pages, 5 in. by 7 in., illustrated, bound in cloth. Published by the author, W. George Knight, 36 Cushing street, Medford, Mass.

This is the second edition of a very popular book on locomotive operation distinguished for its plain common sense treatment of the many difficult problems encountered by those responsible for the operation of locomotives. The first chapters of this book are devoted to the fundamental facts relating to combustion and the generation of steam. In this connection the function of the brick arch, of the superheater and other appliances essential to the efficiency and capacity of the locomotive are described. The maintenance as well as the operation of these devices is dealt with in a commendable manner. There is also a chapter on locomotive front end appliances with particular references to the effect of these appliances upon the operation of the locomotive. Locomotive valve gears and the air brakes are discussed in separate chapters. The chapter on locomotive running is one that could be read to advantage by any locomotive engineer or supervisor of locomotive operation. The final chapter, which deals with a general study of the modern locomotive, does not, of course, deal with this subject in its entirety but contains a good deal of information in a convenient form relating to the principles involved in the design and operation of these modern locomotives. It should be understood, however, that this book does not add any amount of original matter to the subject and would not appeal to anyone who has already made a thorough study of the entire field. The great value of the book will be found in its use as a reference and guide by enginemen, and also by fuel and locomotive supervisors.

Powdered Coal as a Fuel. By C. F. Herington, 303 pages, 8 in. by 9 in., bound in cloth. Published by D. Van Nostrand Company, 8 Warren street, New York city.

This is the second edition of a book which made its appearance about two years ago, and represents both a revision and enlargement upon the original text, although at the time of its publication this book probably represented the best and most complete treatise upon this subject. Since that time it cannot be denied that powdered coal has assumed a wider field of usefulness and is now regarded as a most promising development. This applies particularly to industrial operation, as it has been demonstrated that the limitations imposed upon the locomotive in its present form make the successful application of this fuel to locomotive use decidedly problematical. However, it should be of particular interest to railroad engineers to know that one of the most successful installations of powdered coal under stationary boilers has been accomplished by the Missouri, Kansas & Texas at its Parsons, Kans., shops. It should also be stated in this connection that the American Locomotive Company has met with considerable success in the use of powdered coal in its metallurgical furnaces at Schenectady. Both of these installations are not only described at length in this book, but other installations of similar character in many industrial plants are described in detail. In fact, the book is largely of a descriptive character, relying more upon these descriptions than upon a theoretical analysis of the subject to demonstrate the possibilities of powdered coal. The book shows very completely just what is being done at the present time with powdered coal and may serve to convince many as to what can be accomplished with this fuel.

Developing Executive Ability. By Enoch Burton Gowin, 9 in. by 6 in., illustrated, bound in cloth. Published by The Ronald Press Company, 20 Vesey street, New York city.

While this book is designed primarily for the young executive, without particular reference to his attachment to railroad service, still there can be no question but that the subject is one which should be of keen interest to a very large number of railroad men. It is certainly the greatest personal and individual problem for every young man engaged in railroad service, as well as a problem of the greatest importance to many who have graduated into important executive positions with our railroads. Railroad officers are sometimes criticized on the ground that they do not handle their work with the same degree of precision and system practiced by executives in other business activities. The author, who is assistant professor of commerce, New York University School of Commerce, Accounts and Finance, has endeavored to show how the day's work may be so systematized that it can be cleared away with ease and precision, how the executive may utilize the time thus gained for constructive effort and for the development of mental vision, initiative and reasoning power, and show him how to develop and prepare himself for broader activities and greater responsibilities. The alert and ambitious railroad man, no matter what his relative position may be, will welcome any possible suggestions by means of which he can affect many economies of time, energy and money. The book is in no sense theoretical. It is simply a common sense analysis of those qualities which characterize executive ability and the means by which this ability may be obtained. It is more than interesting to note that in illustrating his point Professor Gowin has often referred to Harriman, Hill and Ripley, and it may be doubted whether the tremendous influence of the old school railroad executives on our modern business organization is even now fully appreciated. This is not only the kind of a book railroad men should read, but it is the kind of a book that they will want to read.

Letters to the Editor

Visual Signals vs. Automatic Stops

OMAHA, Neb.

TO THE EDITOR:

It has been stated that the practical development of automatic train control devices and their use to supplement existing automatic block signals is highly desirable for the purpose of compelling obedience to signal indications. Automatic block signals provide the most desirable and dependable known means of maintaining a space interval between trains. When installed properly and with efficient maintenance, false-clear signal failures are of rare occurrence, and the possibility of collisions from this cause is exceedingly remote.

Failure to obey signal indications that are seen and understood are very infrequent, and the use of automatic train control would, therefore, seem to be limited to preventing such accidents as are a result of an engineman failing to observe signal indications because of physical incapacity; division of attention; unfamiliarity with the district over which he is running, the scheme of indication or the location of the signals.

The difficulties in the way of design and construction of train control devices are varied and numerous. Their maintenance would require the most careful attention, involving an expense many times greater than that of maintaining an automatic block signal system. Train control devices will operate necessarily at infrequent intervals, and it is essential that they do not become inoperative through disuse. Divided maintenance of the roadside apparatus and the engine apparatus would cause difficulty in determining the cause of failures. The impracticability of testing out the engine and the roadside apparatus at any particular location is readily apparent. The many problems to be overcome in the design and maintenance would, however, not constitute as great an obstacle in the way of adoption as the operating problems involved in its use. A train control device of any type must be built upon the foundation ot an automatic block system, to which it should be considered supplemental.

Is the large expense of installation and maintenance of train control justified as a corrective measure for the relatively few accidents which are due to enginemen failing to observe signal indications? Would not train control apparatus, in itself, introduce a fruitful field for disaster due to the failure of the apparatus to function properly? Would its adoption not tend toward decreased vigilance on the part of the engineman and transfer the responsibility for the observance of fixed signals to a mechanical contrivance? With its installation, would we not be looking for relief from the result of disobedience to rules through the agency of a mechanical device which is liable to fail?

The book of rules is our constituted authority and the successful operation of a railroad must be governed by rule. We find that few failures to observe the indications displayed by interlocking signals occur because of the moral effect of the derail which invariably records the violation of the rule requiring a stop when the interlocking system says "stop." Sometimes wheels are slid flat or a few drawbars are pulled out, but nevertheless the stop is made.

Would not some means of checking the indication of automatic signals eliminate the necessity of train control? Why not require a check of signal indications by the men on the engine? Obviously, the fireman could not be expected to be a party to this plan, as his time is much taken up with duties that prevent his observing signals. Investigation of accidents demonstrates usually that the fireman could just as well be excused from testifying, his evidence being recorded as: "I was putting in a fire and don't know anything about the accident."

Why not place a third man on the engine, preferably located on the front end, whose duty it would be to observe signal indications and check them with the engineman by means of a simple electrical or mechanical device which would record the acknowledgment that each had observed the signal. Would not such an arrangement stimulate the observance of rules through the moral effect of the checking device and in case of the physical incapacity or the failure of the engineman, the control of the train could be taken over by the third man and disaster averted. The heavy expense for the installation and maintenance of train control would thereby be saved and the money available for such protection purposes could be used to greater advantage in extending the use of automatic signals to lines now urgently in need of signal protection.

A. H. MCKEEN,
System Signal Engineer, Union Pacific System.

The Collision Scandal

CHICAGO.

TO THE EDITOR:

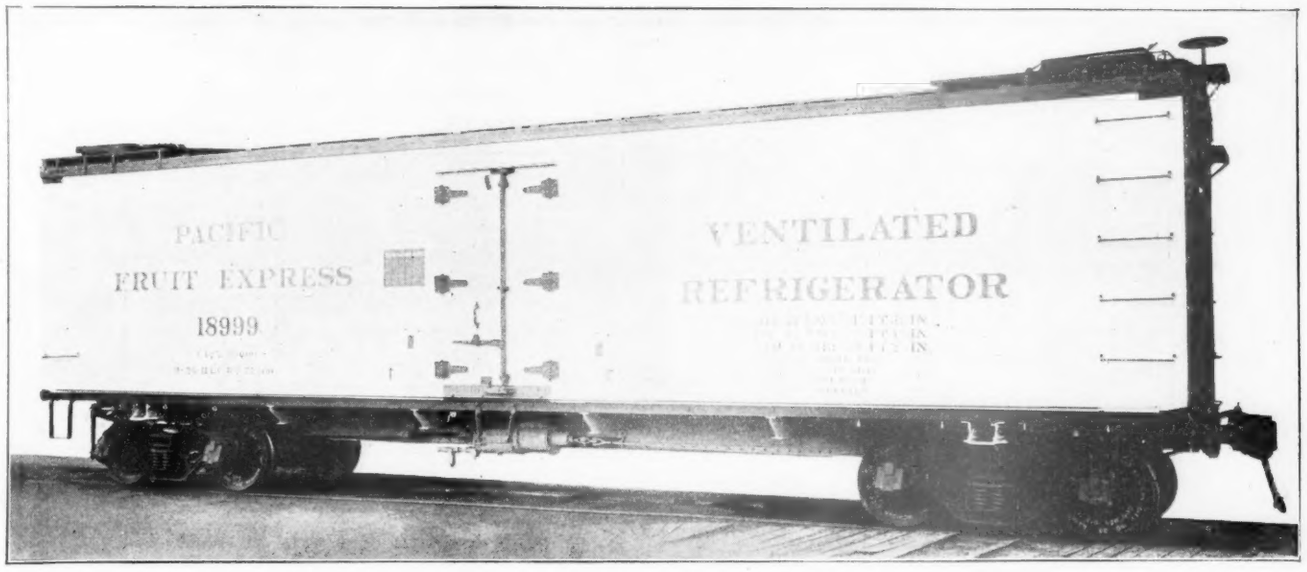
In your issue of October 1 you comment on a communication appearing on page 556 of the same issue on "What Is the Matter with Our Train Rules?" signed V. P. Smith. You say that the Interstate Commerce Commission says that the introduction of the block system is the remedy for the collision scandal, but that the railroads by their action deny that such action is needed. Don't you think this is a little severe on the railroads?

As one who has been deeply concerned in the introduction of the block system and other signaling arrangements on railroads for the past 17 years I must say, in justice to those who furnish the funds for improvements, that the block system has received its full share of support in all cases in which I have been consulted. At the outbreak of the European war in 1914 block signaling appeared to be coming to its own. But that catastrophe and its developments, including our own entrance into the struggle, slowed down, if it did not entirely stop the movement. The railroads have only just returned to the control of their owners and, as far as they can see now, are confronted with a 6-per-cent earning limit and an 8-per-cent price for the use of money. The cost of automatic block signals, which is the only type either the I. C. C. or yourselves would consider up to date, has just about doubled since 1914, and under present financial conditions it is not to be wondered at that those who control the expenditures for improvements are going a little slow in matters of this sort. Even at that I feel safe in predicting that when the 1921 budgets are made public it will be found that the appropriations for block signals will be found to be as liberal, in proportion to what the various railroads feel able to spend, as they ever have been. The mileage to be covered by new signals will probably not be as great during the coming year as it has been in some previous years, but the expenditures, I predict, will be as great or greater. As prices are reduced, as we all believe they will be, the mileage of signals each year will increase at a rising ratio.

It is not fair to attribute the fact that the past four or five years have been lean ones in the construction of block signals to a belief on the part of the railroad managements that such improvements were of no value, any more than it would be to attribute the slowing down of rail relays and permanent bridge work to the same cause.

We have all of us been compelled during the period of the war to wear our clothes longer than formerly.

JAMES B. LATIMER,
Signal Engineer, Chicago, Burlington & Quincy.



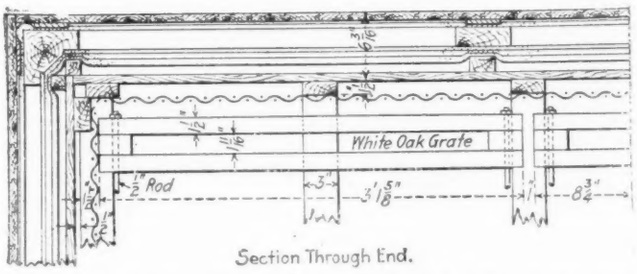
Pacific Fruit Express Refrigerator Cars

Insulation Around the Sides and Ends Is Unbroken; A Continuous Layer of Cork in the Floor

THE UNION PACIFIC has recently placed in service 4,000 refrigerator cars for the Pacific Fruit Express, 1,000 of which were built in the company's shops and orders for 3,000 of which were distributed among the following builders:

Pullman Company	900
American Car & Foundry Company	900
Haskell & Barker Car Company, Inc.	700
Mt. Vernon Car Manufacturing Company	300
Pacific Car & Foundry Company	200

These cars, in general, follow conventional lines of design but possess a number of details of interest, notably the type



Horizontal Section Through the End and Side of the Car, Showing the Method of Carrying the Insulation Around the Corner

and method of applying the insulation. The cars have the following general dimensions:

Length over sheathing	40 ft. 11 1/4 in.
Length between ice tanks	33 ft. 2 3/4 in.
Width over sheathing	9 ft. 2 5/8 in.
Width inside of lining	8 ft. 2 3/4 in.
Capacity of both ice tanks	10,500 lb.
Height, top floor to ceiling	7 ft. 5 1/8 in.
Cubic capacity between ice tanks	2,029 cu. ft.
Distance from center to center of body bolsters	30 ft. 8 in.
Truck wheel base	5 ft. 6 in.
Capacity	60,000 lb.
Truck capacity	80,000 lb.
Light weight of car complete (Built up centre sill)	53,500 lb.
Light weight of car complete (Bettendorf)	52,200 lbs.

The cars were built to two designs, differing only in the trucks and underframe construction. In one of these the Bettendorf single I section center sill and Bettendorf trucks are used while the other involves a double fish belly center sill built up of plates and structural sections, and is carried on Vulcan trucks.

Underframes

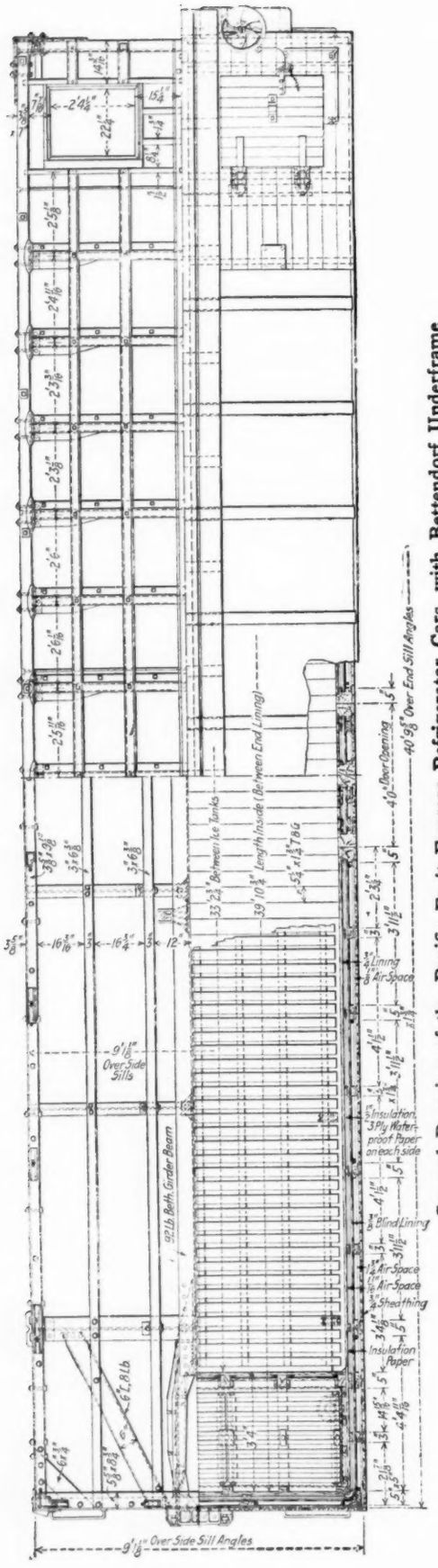
The principal member of the Bettendorf underframe is an 18-in., 92-lb. Bethlehem girder, the depth of which is reduced to 14 in. at the bolster. The bolster is an 8-in., 34.5-lb. H-section, which is framed through the center sill and the rear ends of the draft sill castings.

The center sills of the other underframe are built up of 5/16-in. web plates with 3-in. by 3-in. by 5/16-in. angle flanges at the top on the outside only and 3-in. by 3-in. by 1/4-in. angle flanges on the inside and 3-in. by 3-in. by 1/2-in. angle flanges on the outside at the bottom of each plate. The sills are completed with two 1/4-in. superimposed top cover plates, the lower one extending the entire length of the sills and the other extending 8 ft. toward each end from the transverse center line of the car. The bolsters on this underframe are also of built up box section; the 5/16-in. web plates are spaced 8 in. back to back and reinforced with 2 1/2-in. by 5/16-in. angles on the outside at both top and bottom. The bolsters are completed with top and bottom cover plates, the latter being continuous, and are attached to the center sills on either side with one horizontal and two vertical corner angles.

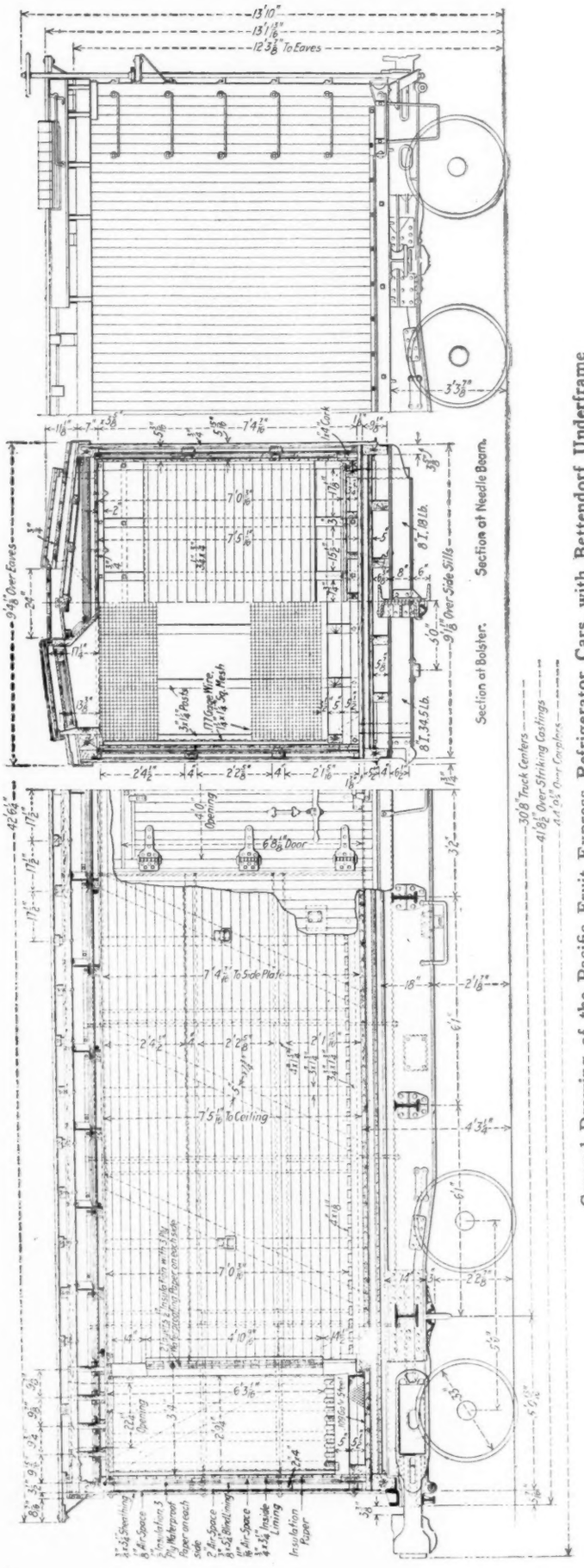
In other respects the two underframes are similar. Both have four 8-in., 18-lb., I-section needle beams, and in each case the end and side members are 4-in. by 4-in. by 3/8-in. and 4-in. by 3-in. by 3/8-in. angles, respectively. Both designs are fitted with Cardwell friction draft gears.

The Car Bodies

The construction of both car bodies is essentially the same. Both have wood frames with the exception of the carlines, which are of pressed steel. The bodies are built up on wood sub-sills; those for the sides and ends are framed into and bolted to the angle members of the steel underframe,



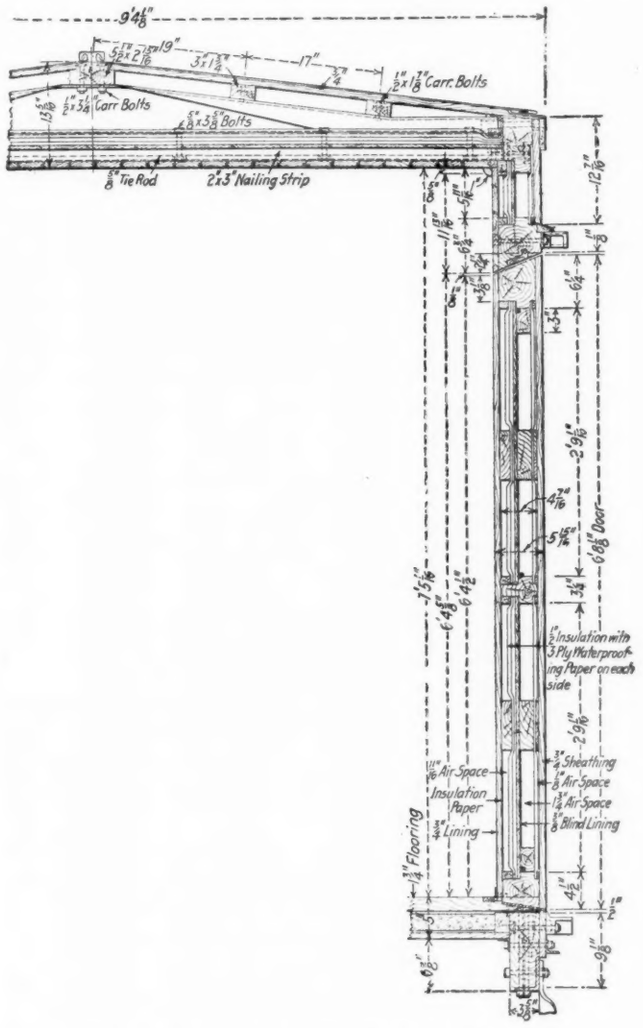
General Drawing of the Pacific Fruit Express Refrigerator Cars, with Bettendorf Underframe



General Drawing of the Pacific Fruit Express Refrigerator Cars, with Bettendorf Underframe

while the intermediate sills are bolted on top of the needle beams.

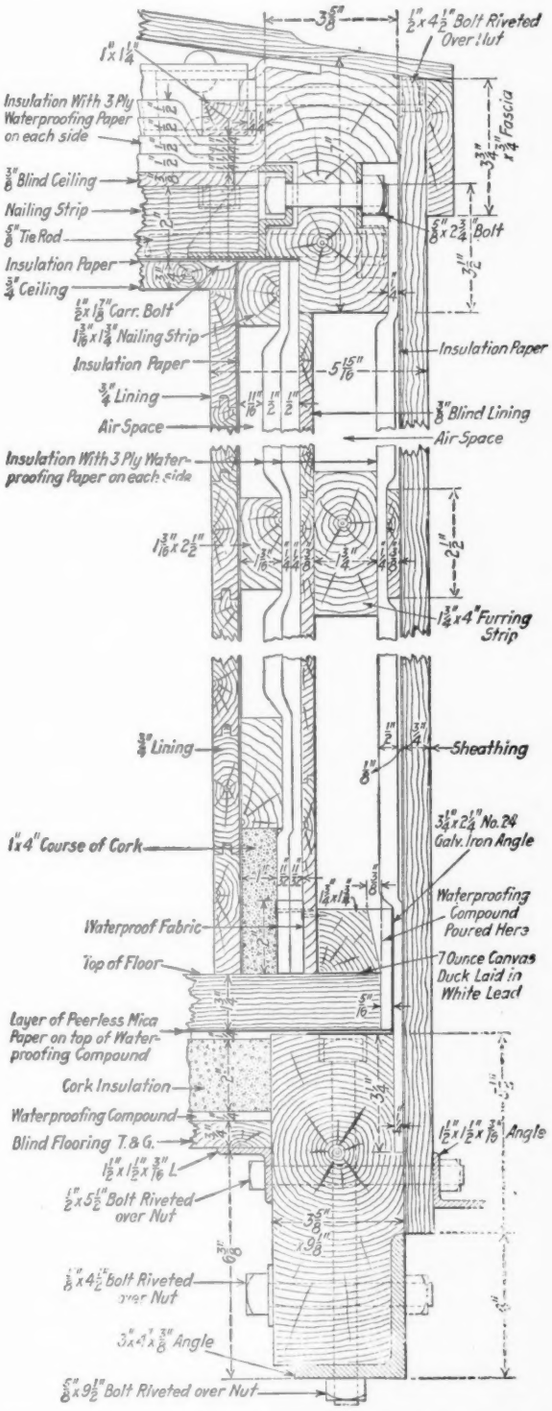
The entire floor construction is placed above the intermediate sub-sills with no enclosed air spaces, which makes it possible to provide continuous floor insulation. The lower floor is ¾-in. tongued and grooved material nailed directly to the top of the intermediate sub-sills, the ends of the boards resting on 1½-in. by 1½-in. angle supports bolted to the inside faces of the side sub-sills. This floor is covered with a ¼-in. coat of Sarco Bituminous Seal, applied hot. A 2-in. course of Nonpareil Cork Board is then laid while the bituminous compound is still hot and this is sealed with another ¼-in. coat of the hot waterproof compound. The insulation



Cross Section of the Car Body at the Door

thus built up is covered with a layer of Peerless mica surfaced insulating paper with the seams carefully joined to prevent moisture passing through and the upper floor, of 1¾-in. tongued and grooved material is then laid. The ends of the flooring are nailed to the tops of the side sub-sills and the boards are further secured by nailing through the insulation into the two center sub-sills.

The side construction provides three air spaces between the inside lining and the sheathing. The first course of insulation, consisting of one layer of ½-in. Keystone hair felt between courses of three ply waterproofing paper is placed outside the frame before the outside sheathing is applied. This insulation, as is shown in one of the drawings, extends continuously from door post to door post around each end of the car and is secured to the frame members by ⅜-in. nailing strips. After a layer of Per Bona insulating paper, also extending continuously from door post to door post, has been laid over the nailing strips, the sheathing is applied. There is a nominal air space of ⅛-in. between the unrestrained portions of the insulation and the sheathing.



Section Through the Side of the Car Showing Details at the Junction of the Side with the Ceiling and Floor

An intermediate lining of ⅜-in. ship lap material is mailed to the inside of the frame members, and against this is laid the inside insulation, consisting of two thicknesses of the hair felt covered on each side with three ply waterproofing paper. This extends continuously around the ends of

the car from door post to door post and is held in place by 1 3/16-in. nailing strips, over which is placed a continuous covering of Per Bona insulating paper before the inside lining is applied.

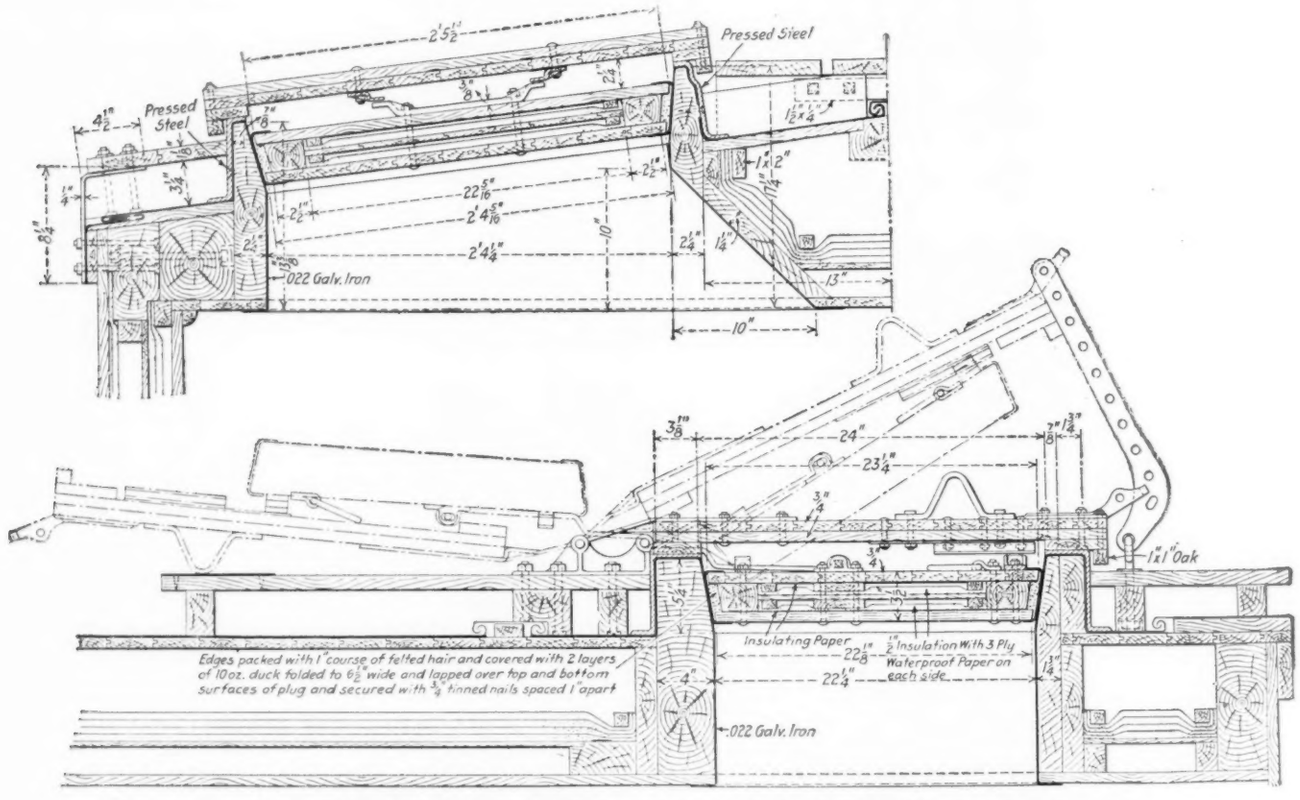
In the bottom of the side and end walls, a strip of 1-in. by 4-in. cork board is laid on top of the floor between the inside lining and the inside layers of insulation. This is held in place against the floor by a 1 3/16-in. belt strip placed directly above it. To further protect the insulation and the concealed wood work at the floor line from the penetration of moisture, the lower edges of the two inside layers of hair felt are enclosed in a waterproofed cotton fabric placed under the edges of the insulation and folded up the sides for a distance of two inches above the floor; the nailing strips for the blind lining at the floor are covered with canvas laid in white lead on the floor and lining sides, and the 5/16-in. spaces between the ends of the floor boards and the outside faces of the side sills are filled with hot waterproofing compound extending up 3½ in. to the top of the blind lining nailing strips.

The details of the construction of the hatchway openings and the methods of securing the insulation at these points are shown in the drawings. The hatch covers and plugs are both hinged from single sets of hinge fixtures with separate hinge connections and they are arranged so that the hatches may be opened for ventilator service.

The Bunkers

The bunkers are enclosed by a bulkhead the outside face of which is 3 ft. 4 in. from the end lining. The bulkhead is built up on 3-in. by 4-in. oak posts and consists of two courses of ¾-in. tongued and grooved material separated by two ½-in. thicknesses of hair felt insulation covered with three ply waterproofing paper. The first course is laid against nailing strips between the posts and the outer course is nailed directly to the faces of the posts. The top and bottom bulkhead openings are 14 in. and 12 in. deep, respectively.

The ice tank is fitted with a floor pan of galvanized steel and the lining of the end and sides of the car is covered with galvanized iron extending from the floor pan to the ceiling.


Pressed Steel
Pressed Steel
.022 Galv. Iron
1"x1" Oak
Insulating Paper
1" Insulation With 3 Ply Waterproof Paper on each side
Edges packed with 1" course of felted hair and covered with 2 layers of 10 oz. duck folded to 6½" wide and lapped over top and bottom surfaces of plug and secured with ¾" tinned nails spaced 1" apart
.022 Galv. Iron

Transverse and Longitudinal Sections Through the Hatch, Showing Method of Ventilating the Car

The Roof

The cars are fitted with the Murphy X L A outside metal roof and, with the exception of those at the ends of the hatchways, the carlines are of pressed steel of inverted U-section with one side extending down to form a support to which the ceiling structure is bolted.

The roof insulation consists of four layers of the ½-in. hair felt insulation, covered on each side with three ply waterproofing paper. This insulation is placed between the steel carlines and the blind ceiling, which is built up of ⅜-in. ship lap material on top of 2-in. by 3-in. transverse nailing strips. On the lower face of the nailing strips the ¾-in. tongued and grooved ceiling is applied and the whole structure is secured to the carlines by ⅝-in. bolts with the nuts countersunk in the underside of the nailing strips.

The galvanized wire ice basket is spaced 1½ in. from the end lining, 1⅝ in. from the side linings and is attached directly to the inside faces of the bulkhead posts. The bottom of the basket is closed with an oak grate made up of 3½-in. by 1½-in. bars extending across the car and supported on six supports of 3-in. by 5-in. oak, the tops of which are 10½ in. above the floor.

The floor racks are built in two longitudinal sections at each end of the car, hinged at the sides to swing up against the lining. Each section is supported on four 1¾-in. by 3¾-in. longitudinal members and is made up of 1⅛-in. by 4-in. boards spaced 1 9/16 in. apart.

The trucks on the cars with the built up underframes have Vulcan side frames and Buckeye bolsters, the ends of which rest on Barber roller spring seats. The journals are 5-in. by 9-in. and Creco No. 2 brake beams are used.

The Transportation Problem in the Coal Industry*

Some Lessons for the Future Taught by the Experience During the War Period

By A. G. Gutheim

Manager, Public Relations Section, Car Service Division, American Railway Association, Washington, D. C.

THE FIRST EVIDENCE of difficulty in the transportation of bituminous coal is a coal car shortage,—that is, an inability on the part of the railroads regularly and adequately to meet the demands of the mines for empty cars in which to load and ship their production to market. Coal car shortages have been so serious and so nearly continuous for the past four years that there is a tendency to forget that the situation previously was just the reverse. For many years prior to the late summer of 1916 there customarily existed in this country a surplus of cars available for coal loading in excess of all demands therefor, almost 90 per cent of the time. The occasional coal car shortages were strictly seasonal and local: nation-wide or long continued difficulties of this sort were unknown.

The seasonal and local coal car shortage is the result of a sudden and heavy demand for coal which comes late each summer in anticipation, and later accentuated by the arrival of cold weather. The cure of such difficulties is more with the consuming public than with the producers and carriers. The former may, with little if any loss, purchase and store their extraordinary winter's coal requirements in part at least, earlier in the season, when mine and transportation facilities are not, as a rule, fully utilized. But the latter, in effecting a cure, must mine and transport with even greater intensity during the period of strong demand. This would require larger investment in mining and transportation equipment and more employees in those industries, and this is something to be avoided where possible, and certainly in the bituminous coal mining industry.

If the future held in store no more serious problems in bituminous coal transportation than those customarily met with prior to 1916, the subject could be dismissed as not of particular importance. But our experience since 1916 has been distressing, and at times attended with danger. That experience warrants serious consideration of its causes, and the best endeavors of all concerned to eliminate those causes henceforth.

General Effect of the War

War is essentially a consumer of iron and steel, and iron and steel production depends mainly on coal, coke, ore and fluxing materials as the basic raw commodities. Moreover, fuel is relatively a greater factor in iron and steel production than in most other lines of manufacture. The shift from peace to war industry called for extraordinary coal production long before we entered the war, and our activity as a belligerent greatly increased this demand. Simultaneously came greater demands for the other basic commodities of iron and steel production. All these commodities are invariably shipped in bulk and usually and by preference require open top cars, commonly called coal cars, for transportation.

The territory Chicago-St. Louis and east thereof and north of the Ohio and Potomac rivers is the great workshop of our country. It is the location of by far the greater part of our population, and the greatest density of population and traffic. If to its bituminous coal production is added that of the bordering states of Virginia, West Virginia and Kentucky, largely consumed in this great workshop, we account for fully 75 per cent of our total bituminous production. In this territory are located our great centers of iron and steel manufacture, producing perhaps 80 per cent of all our iron and steel articles. On its Lake Erie shore are the docks over which the regions beyond the lakes obtain their annual requirements of 25 to 30 million tons of coal and in return send their double quantity of ore. On its North Atlantic coast are great tidewater coal piers transshipping millions of tons of coastwise and export coal, both anthracite and bituminous, annually. There also are located the ports through which, first for convenience, and later for convenience and necessity, was handled most of the tremendous overseas movement of men and materials from 1915 on. And throughout this period, freight and troop movements within and to and from this territory, east, west, north and south, were conducted on lines of railroad never built to carry this concentrated load, and claimed by the owners to have been stunted in development during several years preceding by hostile, or at least unwise policies of government regulation. Furthermore, many of the more important gateways through which this war traffic had of necessity to move were manufacturing cities of major importance in the war program, which were then undergoing great industrial expansion and development, without contemporaneous development of their railroad facilities. Nothing, perhaps, more clearly emphasizes the stress in this territory than the action of the War Industries Board toward the close of actual hostilities, designed to effectually limit any further location of industry in the eastern portion thereof.

It would be just criticism of this paper to say that thus far many words have been used to outline a situation which the French sufficiently describe by a shrug of the shoulders and the comment, "C'est la guerre." The truth is that the war was the primary cause of our coal transportation difficulties, and as indicative of this, note the trend of bituminous coal production in the United States in recent calendar years:

	Net tons		Net tons
1910	417,111,000	1916	502,523,000
1911	405,907,000	1917	551,791,000
1912	450,105,000	1918	579,386,000
1913	478,436,000	1919	458,063,000
1914	422,701,000	1920 (Est.)	542,000,000
1915	442,622,000		

What has been said heretofore constitutes, in the opinion of the railroad man, the basis of a complete defence on the untrue charge so often made that "the railroads broke down" during the war. Perhaps nothing has contributed so much by way of ostensible support of this charge as the oft repeated statements and advertisements of gross coal car shortages at the mines. There were coal car shortages, to be sure, and their effects were at times serious, but the blame therefor lies at no one door. Accepting the war as the primary cause, it is profitable to study the supplementary causes right down to date, with some consideration of how to eliminate them in the future.

The War Demand and Its Results

Bear in mind that for some years before our war activity commenced the bituminuos coal mining industry in this country was much overdeveloped. Financial conditions

*Abstract of an address before the American Economic Association, at Atlantic City, N. J., December 28, 1920.

within the industry were by no means good and competition was exceedingly keen. Two rather lean years just before we hit our stride in war manufacturing did not, of course, better this situation. The market was chronically a buyers' one. The light demand and low production in these preceding years left no great stocks in consumers' hands upon which to play in undertaking our new industrial venture. A strong demand for coal came very quickly and by midsummer 1916 reached extraordinary proportions for that time. The war load was then well upon our railroads, and the demands for service required such continuous use of facilities as did not allow the desired opportunity for conditioning the same. Then began also the difficulties of the roads in obtaining additional equipment, due to the preemption of industry first by more profitable and later by what was deemed more essential work. But under the conditions as they then obtained the 1916 bituminous production went over 500 million tons, even with a late start, and such coal car shortages as developed were as a rule peculiarly the result of particular situations incident to expansion of production on certain lines not favorably placed to handle the same.

Under these circumstances, with no control over the marketing of bituminous coal except that afforded by the law of supply and demand, the inevitable happened. By the beginning of 1917 we were in a period of rapidly mounting coal prices, while contemporaneously there came to Washington in ever-increasing numbers, consumers whose very industrial life depended on regular and adequate coal supply and who found great difficulty in obtaining it. Statistics to show currently the true state of production, distribution, consumption, and stocks were utterly lacking, as indeed, is largely the case even today. There was, however, an undeniable shortage of cars at the mines and quite naturally the whole difficulty was attributed to this railroad disability.

Looking back at the production of 550,000,000 tons in 1917 and 580,000,000 in 1918, with stocks upwards of 25,000,000 tons at all times and reaching 63,000,000 tons on Armistice Day, it is easy to deduce that while the difficulty could have been cured by more transportation, permitting greater production, it might also have been cured largely and perhaps entirely by more economic distribution by the coal operators. That uneconomic distribution was at least a factor in the trouble was clearly shown by the nature of the demands made upon the railroads, and by the large stock piles of different consumers in different places. Admitting them to be extreme cases, it may be cited that one lot of Illinois coal, which does not ordinarily move east of Toledo and Detroit, went to the amount of 200 cars to Connecticut, while a coal car shortage on a southwestern railroad was found to result from shipments to the Twin Cities and beyond, whereas the normal market never went north of Omaha. Of the crosshauling of coal and the carriage of "coal to Newcastle" there was almost continuous evidence, although their exact extent could not be ascertained without the most thorough and complete policing and checking of the entire coal movement.

There was further waste of rail transportation, particularly in the bituminous coal movement to New England—one of the danger spots—because of the dislocation of ocean transportation. The fuel administrator for New England was not far wrong when he stated that removing coal-carrying vessels from coastwise services was equivalent to pulling up a four track railroad to his section. New England cannot be fueled all-rail any more than can our northwestern lake states. Instead of maximum ocean and minimum rail movement of bituminous coal to New England we found ourselves by force of circumstances in 1917 and early 1918, attempting the reverse. The rail gateways were incapable of handling what was attempted, and even so, the extraordinary use of such gateways for coal of necessity adversely affected other war movements. Furthermore, a car of bituminous coal moving to New England all rail requires at least double the car-days necessary to handle the same tonnage to New England rail and ocean. To those circumstances must be largely attributed the failure to protect New England more adequately in the winter of 1917-1918. And right here it may be noted that throughout this last year, New England, to escape foreign competition in the purchase of tidewater coal and ocean freight rates which greatly exceed rail rates, has leaned more and more on all-rail coal.

Nor was it possible to control distribution through the medium of our regulation of interstate commerce. The cardinal principle of that regulation is that carrier's rates, rules, regulations, and practices shall be just, reasonable, and not unduly discriminatory as between persons, places, and commodities. To be sure, the Interstate Commerce Commission early lent its support to the Council of National Defense and the Railroad War Board in their joint endeavors to cope with the situation. Always, however, there was before the carriers the statutory prohibition against undue discrimination, and the consequent possibilities of heavy suits for damages.

A suggestion early made to the Fuel Administration was that the movement of bituminous coal be zoned in such manner as to afford more economical distribution, both from the standpoint of war requirements and transportation possibilities. These efforts, although backed by the Council of National Defense and the Railroad War Board, were of no avail. Fortunately, the suggestion met with favor at the hands of the Railroad Administration shortly after it took hold. The immediate result was a prompt and careful study of the whole situation by a committee of both administrations on the basis of the original suggestions of the Council of National Defense and the Railroad War Board. The committee recommended, and, effective at the beginning of the coal year April 1, 1918, there was promulgated a zoning scheme which stood the test of the remainder of the strict war period. This greatly increased the ability of the railroads to transport bituminous coal and facilitated proper distribution. Shortly afterward the Railroad Administration, exercising its extraordinary powers, made even more stringent rules preferring coal in the use of open top cars than had previously existed. These new conditions, coupled with the more effective organization and efforts of the Fuel Administration, were responsible for the 1918 figure of 580,000,000 tons production. It has frequently been said that had the armistice not intervened production for that year would have reached 600,000,000 tons. The fact is, however, that the saturation point had been reached in some sections before the armistice, and it may be doubted whether production would have been maintained after that date at anything like the high rates established before, even had hostilities continued.

Coal Car Supply During the War Period

It will be profitable here to give consideration to some of the transportation features of the situation which faced the country in 1916, 1917 and 1918, and under which maximum, and in fact, reasonably adequate coal production was obtained for the country as a whole even though there was habitually throughout that period the cry of coal car shortage at the mines.

So far as the records of the coal loading railroads of this country permit such a comparison, it appears that on January 1, 1916, they were serving 3,646 mines with an established rate capacity of 43,524 cars per day. Of these, 190 mines were undergoing what is known as development. On January 1, 1917, the total mines served by the railroads numbered 4,916, with an established daily capacity of 55,158 cars; 358 of these mines were in the development stage. On

January 1, 1918, the mines served numbered 6,157, with a rated capacity of 59,968 cars daily, 840 of these mines being counted as developing. All mines included in this comparison are established tipple mines—mines which have a permanent arrangement at the location of the mine itself for loading coal over a tipple into cars. So-called wagon or country bank mines, which are of a temporary nature but in a period of strong demand for coal frequently number two or three thousand, are not included. An outstanding feature of the comparison is that in 1917 and 1918, two years during which there was no regulation of prices and distribution until the last five months, the number of tipple mines increased almost 70 per cent, and their capacity in the neighborhood of 40 per cent. Expressed another way, the average capacity per mine per day on January 1, 1916, was about 12 cars, whereas, on January 1, 1918, it was less than 10 cars. Although the established mines had during these two years been developing to even greater capacity, the multitude of new mines was enough to bring down the average capacity per mine. This in itself meant a waste of transportation.

For many years coal loading railroads have, in times of shortage, distributed the available cars to mines daily on the basis of their established rated capacity. One of the achievements of the Railroad Administration was the establishment of uniformity of practice on all roads in this respect. Common carriers are not equipped to handle all peak loads currently. This fact and the development of the bituminous mining industry far beyond maximum requirements of the country inevitably means a car shortage during such peak demands as have been made since 1916. Every increase in development of the industry without corresponding increase in demand for product and railroad facilities of necessity means that the available cars must be distributed to more mines in a lower ratio to established rated capacity. Expressed in another way, more mines must be served with the same number of cars in order to get from all mines in the aggregate the same tonnage of coal that could be produced by fewer mines served with more cars per mine. The point to be borne in mind is that even with a coal car shortage, and with a pronounced coal car shortage, it is entirely possible to keep the country fully and adequately supplied with coal.

The weekly reports of the Geological Survey enlighten us as to this. It is to be regretted that the data furnished the Survey as the basis of its reports is only about 60 per cent complete, but relying as it must upon the good will and co-operation of the coal operators, and without any law back of it, the Survey has been able to report week by week a fairly accurate figure showing the percentage of full time worked and the percentage of full time lost at the bituminous mines, for various named causes. Applying to the tonnage produced weekly the percentage of full time worked gives an idea of the potential capacity of the mines, and this furnishes some rather startling indications of the overdevelopment of the industry. Judged by these reports the mines have a potential ability to produce bituminous coal to the amount of 18,500,000 tons weekly, or considerably over 900 million tons per annum. One has merely to view this figure in the light of the maximum requirements of the country as indicated by our war experience and the assumption that our railroads can handle at least that, currently, to see that even a 20 to 30 per cent car shortage is inevitable at coal mines during a period of maximum demand for coal. That indeed, has been our experience this past summer and autumn even while production was exceeding current requirements week by week.

It is not, of course, to be contended that the mines would produce at the rate of 18,500,000 tons week by week even if the country would absorb the same, for manifestly the men could not continue maximum effort indefinitely. The point is that the failures of the carriers as shown by the reports of the coal operators are measured by a figure which reflects the maximum of productive effort in a greatly overdeveloped industry. It is significant that contemporaneously the demands for cars made upon the railroads by the same mines indicate a desire to load currently about 16,000,000 tons weekly. But even on this basis a car supply 25 per cent short would more than meet the country's needs for coal.

The Post-Armistice Difficulties

In the period following the armistice we find first, as a consequence of the industrial slump after the termination of actual hostilities, that the demand for coal fell off very quickly. There was further a seeming disposition throughout the country to utilize stocks which the Geological Survey estimates at the tremendous total of 63 million tons on Armistice Day. In consequence, production which had averaged 12 million tons weekly for months before the armistice, fell at once to a 10 million average, and in the first six months of 1919 to 8¼ million. The railroads meanwhile were carrying the greatest car surplus ever recorded in our railroad history, the maximum figure being about 450,000 of all classes of cars daily, out of a total serviceable ownership of about 2¼ million.

By June, 1920, in some producing districts and quite generally by late July, the demand for coal was again in excess of the ability of the railroads to furnish transportation therefor, and another car shortage period began. This time the fundamental causes were different than in 1916-1918, but the situation was certainly as acute. Surplus stocks had been largely consumed. The mines had been running on short time so long that there was even greater than ordinary eagerness on the part of operators and miners to get back to maximum production. The railroads had been through three war years during most of which the wheels had all but been run off their locomotives and freight cars in continuous service. Usual retirements of freight equipment and replacement by new units had been impossible for one or another war reason, while demands for empty coal cars exceeded even those of the war period. This task before the roads was rendered even more difficult in August, 1919, when employees in the railroad shop crafts began to strike. These strikes continued throughout that month and greatly militated against good service.

Bituminous Miners' Strike, November-December, 1919

By September 1 railroad conditions were somewhat more stable, but by this time the bituminous coal miners' strike was already in sight. Plans were laid by the Railroad Administration for immediate improvement in the service for coal. A minimum production of 11 million tons weekly was the mark set. It was attained in the first week of September, and consistently exceeded thereafter down to the date the strike broke, November 1, 1919. During the last two weeks of October preferential transportation for coal was accorded everywhere, even to the exclusion of other commodities, and production broke all previous records.

The advent of the strike cast additional burdens on the railroads, although the demand for coal-carrying equipment immediately fell off over 60 per cent. The Fuel Administration, recalled to activity and having neither organization nor funds, proceeded to exercise its principal function, that of distribution, through the medium of the director general of railroads. The program for the country's protection involved the holding on wheels of some 300,000 carloads of bituminous coal in the hands of the carriers on the morning of November 1 and the rationing of the same according as needs developed. This was an exact reversal of the railroads' usual function of transportation to destination and

delivery to consignee as rapidly as possible. It very effectively hindered transportation generally.

The work of the director general in his agency for the Fuel Administration has been much criticised. To be sure, it was by no means perfect, but undertaken at a moment's notice, and handled of necessity by a nation-wide organization created by wire overnight, it hardly could be. Speaking as a member of the director general's Central Coal Committee, the writer ventures the statement that the criticisms are based mostly if not entirely upon hindsight, and volunteers the information that the critics of history presented no concrete suggestions for improvement while the emergency was on. Even the accredited representatives of the bituminous coal producers in Washington throughout the strike were unable from day to day to furnish any dependable information with respect to the possibility of resumption of work. The same representatives who on one day would insist that settlement of the strike was in sight and that the coal on wheels could be safely released, would on the following day congratulate the Central Coal Committee for not having followed the advice previously given. Under such circumstances there was but one sound policy in the face of the rapidly declining coal reserves, as evidenced by the coal under load on wheels. That was to "play safe" and that policy was consistently followed until there was reasonable certainty that work would shortly be resumed.

Production during the strike was largely obtained in the northern Appalachian fields. Available reserves were most rapidly absorbed in Ohio and the states west of the Rocky Mountains. For their protection thousands of cars of eastern coal were moved west extraordinary distances and over extraordinary routes. Most of this eastern coal was higher priced than the coal customarily sold in that western section. The consequence was that with the cessation of the strike in sight and the possibility of cheaper production at hand, those for whose protection this coal had been moved west refused to accept it, and thousands of eastern cars were tied up under load in the west for weeks. Eventually the coal was parcelled out to the railroads, the steel companies, and other large consumers who were able to utilize it.

The Situation in 1920

Although the miners' strike was settled in mid-December, only fair production materialized in the winter months of January, February and March. It was not sufficient to accomplish more than current protection for the country, and gave no opportunity to build up the greatly depleted stocks.

Federal control of railroads terminated February 29, 1920, and private operation in March showed progress in improved bituminous production. But in the first week of April began the outlaw strikes of the switchmen. Again production dropped to exceedingly low figures, and low marks continued for many weeks. Net ownership of coal cars by our railroads had not increased during federal control and the "bad orders" were excessive. The small stocks, estimated by the Survey as 24,000,000 tons March 1, and the extraordinary dislocation of coal cars throughout the country, a result of the heavy movement of eastern cars west during the strike, made matters worse.

Profiting by our experience during the war, the Congress in enacting the Transportation Act, 1920, made provision that enabled the Interstate Commerce Commission to assist materially in meeting the situation. Under this legislation the commission, whenever in its opinion an emergency exists, may authorize some departure from the cardinal principles of just, reasonable, and not unduly discriminatory practices in our scheme of transportation. Immediately upon the representation by the railroads that such an emergency as the statute contemplated did in fact exist, the commission took active and energetic steps calculated to remedy the situation. First was an order relieving the railroads from the necessity of following shipper's routing, and simultaneously came a series of car relocation orders to bring back from the west to the coal mining territory of the east thousands of empty coal cars. Subsequently, for the further relief of the coal situation, the commission specifically authorized preferential utilization of coal cars for coal loading. Additional emergency service orders resulted in the reinstatement of war-time measures requiring the pooling of coal moving to Lake Erie and Tidewater ports for transshipment by vessel beyond, thereby avoiding car and vessel detention. Still further, in order to assure the territory beyond the Great Lakes and the people of New England of adequate coal supplies for the coming winter, preferences were set up for their benefit.

All these measures did, to be sure, discriminate to a certain extent against other industry, but the discrimination was only what Congress contemplated in authorizing the commission to take action of this sort to cope with emergencies. Much as it is to be regretted that other industry had to suffer, there is satisfaction in the thought that the programs laid down have all been fully completed, and there is every indication that the coal situation in the country as a whole is in a safe condition for this winter.

In the rather harsh experience of the past four years there are these signs for the future.

First. The bituminous coal mining industry is developed far beyond the present or immediate future demands of our domestic and foreign trade in bituminous coal.

Second. Our railroad facilities are probably adequate today to handle our necessary annual bituminous output produced with fair uniformity of rate throughout the year and will certainly be adequate when post-war rehabilitation of the properties is completed.

Third. Our railroad facilities are not, and without great waste of investment never can be, adequate to handle currently our necessary bituminous coal production when obtained by weekly peaks of 13,000,000 tons and valleys of 7,500,000 tons in a 12-month period, as has been the case these past two years.

Fourth. While the powers of the Interstate Commerce Commission are sufficient to force transportation for such extremes of production, the exercise of such powers necessarily involves discrimination against other traffic and should be avoided if at all possible.

Fifth. While our present railroad regulation can force production, it can control distribution but slightly, and prices not at all.

Sixth. Extreme variation in rates of production not only unduly burdens the transportation machine, but invites further overdevelopment of mining, with the consequence of greater irregularity in miners' working time.

Seventh. So long as regulatory power exists to force coal production at the expense of other industry, similar power should exist to compel proper distribution of such production, should necessity therefor arise.

Eighth. Provision should be made, by additional legislation if necessary, for the securing and compilation by proper governmental authority, of current and complete statistics of production, distribution, consumption, and stocks, of bituminous coal.

To conclude, let it be kept in mind that production, transportation, distribution, and consumption, are the four big factors in the bituminous coal industry, and should be reasonably well balanced. Of course, such disturbances as war and nation-wide strikes constitute emergencies which require corresponding treatment. But under ordinary conditions proper co-ordination of these four big factors is possible and the result should be better conditions of mining and railroading, lower costs of production and transportation, and better prices and distribution to the consumer.

The New Era of Railroad Transportation in America*

Importance, Both to Carriers and Shippers, of Maintaining the Spirit of Friendly Co-operation

By Lewis J. Spence
Director of Traffic of the Southern Pacific Company

THE FIRST CHAPTER of the railroad history of America was that of development; every section of the country clamoring for railroads; when this clamor was satisfied we had the period of restrictive legislation, the second chapter; this was primarily designed to correct evils, but it became severely repressive. The third chapter was that of the period of the world war, when the roads were in the hands of the government; and now, under the Transportation Act of 1920, we have the fourth chapter. During the first six months of private management the restoration and maintenance of existing equipment has cost $792,000,000, and during the same period $569,000,000 was expended for maintenance of way and structures. The American and Canadian railroads together since January 1 have ordered 1,770 locomotives at a cost of $106,000,000; 73,593 freight cars, at a cost of $221,000,000; and 997 passenger cars at a cost of $23,000,000—a total of $350,000,000. Abolition of off-line traffic agencies [which the speaker believed unwise] was remedied as soon as possible. Some lines even anticipated the return of the railroads on March 1 by re-organizing their agencies to be ready on that date; and the recruited forces now in the field have restored to their patrons a convenient medium of intercourse and accommodation. Freight train schedules have been materially improved and are better maintained. Daily merchandise cars have been extensively re-established. Systematic passing reports to shippers are being rapidly restored. Passenger train service will soon be as satisfactory to the public as it was prior to the period of federal control.

Re-organization of the tariff bureaus and creation of necessary expert rate committees and administrative committees to deal with readjustments and meet the current traffic problems of shippers and carriers have been accomplished. Besides the passenger organizations, which it is unnecessary to enumerate, we now have in the west the Transcontinental Freight Bureau, the Southwestern Freight Bureau, the Western Trunk Line Freight Bureau and the Western Classification Committee; in the south the Southern Freight Rate Committee and the Southern Classification Committee; and in the east the Trunk Line Committee, the Central Freight Committee, the New England Committee, and the Official Classification Committee—which embrace standing rate committees, composed of experts who have no connection with individual lines, thereby assuring every rate proposition shall receive the benefit of expert analysis and unbiased judgment, which ought to be of incalculable benefit to the shippers of the country as a whole.

In addition there are the Consolidated Classification Committee, and the National Perishable Freight Committee, whose chairman devotes his whole time to perishable freight problems. The standing rate committees are not clothed with any power to make rates and the full right of individual action is reserved to every line. Traffic executive committees have been created in each of the three territorial subdivisions of the country—the Eastern Committee with George H. Ingalls as chairman; the Southern Committee with Lincoln Green as chairman; and the Western Committee with your humble servant as chairman.

*Abstract of an address at the dinner of the National Industrial Traffic League at the Waldorf-Astoria Hotel, New York, November 18, 1920.

Public Opinion Vindicated

If there has been any failure to thus far accomplish anything which should have been accomplished since the return of the railroads to their owners, I am not here to excuse it by asserting that more might have been accomplished if shippers had utilized equipment more economically or efficiently. I am here to remind you that the railroads were relinquished by the government in deference to a crystallized public opinion that, with their credit rehabilitated and fostered, and confidence restored, adequate and satisfactory service would be best assured under private management. I am here to claim that public opinion has been already vindicated by the substantial progress that the railroads have made under private management in spite of their difficulties, and I am here to concede that these results could not have been obtained without the cordial co-operation of the shippers.

National Industrial Traffic League

The National Industrial Traffic League is a national organization. If any railroad officer has failed to realize its usefulness as an invaluable assistance to the carriers, he should stop and take his bearings. As a member of the executive traffic committee which met with your committees during the progress of the recent rate case, I can testify to a breadth of view and a spirit of co-operation on your part which every skeptical railroad officer should have witnessed. It is a great pleasure to publicly and gratefully acknowledge the invaluable service which you have rendered in crystallizing public sentiment against the perpetuation of governmental operation; in the passage by Congress of the most constructive transportation legislation that has ever been enacted; and in giving your affirmative support to the applications of the carriers for the increased revenue contemplated by the Transportation Act.

The Future

There is still much to be accomplished by the railroads, and no organization of men is better qualified than the National Industrial Traffic League to set up the sign posts of public opinion to guide us on our way. Every carrier is interested in stimulating the traffic of the section which it can most advantageously serve, and nearly every commodity rate is initiated by some interested line. You and I are too close to the subject to subscribe to the statement frequently made that there is no longer any competition of rates. Our present traffic machinery, while subjecting rate adjustments to expert examination to avoid destructive rates or wasteful transportation, is designed to preserve all of the benefits of individual initiative and competition among carriers.

I think that the National Industrial Traffic League should have been formally notified of the completion of our rate making machinery and supervisory traffic organizations. Answering the shippers' resolution formulated at Chicago on October 22, I would say:

1. The part taken by the shippers in advocating important and essential provisions of the Transportation Act, and of the National Industrial Traffic League in supporting the recent application of the carriers before the Interstate Commerce Commission, are not unappreciated.

2. The recent horizontal increase was granted by the

commission with the understanding that such readjustments as the facts might warrant would be promptly undertaken.

3. It is assumed that the dissatisfaction expressed by this resolution does not apply to legitimate efforts to obtain increased revenue where it can be shown that the revenue accruing to any group of lines under the new rates is insufficient to yield the result contemplated by the Transportation Act, and that it is realized that the rate readjustments to which preferred attention is advocated cannot all be made by reductions without impairing the aggregate revenue which the authorized rates were designed to yield. I have no knowledge of efforts to "put over" change after change in individual rates solely to secure further and unauthorized increases, and if such are made at this time I consider it the duty of executive traffic officers to suppress them.

4. The carriers should give immediate attention to the readjustments contemplated by their application.

5. The protest against a continuance of the general revision of consolidated classification has been anticipated by the Consolidated Classification Committee, which has adopted the policy that no action be taken at this time as to items in Appendix 6 as a whole. The Consolidated Classification Committee will proceed to handle in the regular way applications from shippers.

Before becoming impatient with any delay that may ensue in the readjustments that are expected to follow the horizontal increase of rates, permit me to urge due consideration of the fact that the carriers must proceed in a prudent, business-like way, that will commend itself to the Interstate Commerce Commission, which must now share the responsibility of preserving sufficient revenue to provide adequate transportation. As yet it is difficult to forecast the effect upon net revenues which the commission has undertaken to provide. Many of you gentlemen are sufficiently experienced to realize the practical obstacles that are encountered from day to day. I do not intend to excuse any unnecessary delay, and you may repose confidence in the traffic officers of the railroads doing everything that is consistent and practicable to expedite equitable readjustments.

Co-operation Between Shippers and Carriers

The co-operation that has been established between the National Industrial Traffic League and the carriers must not be, and shall not be, interrupted by any effort of railroad officers to shirk the responsibility that is now imposed upon them or by any failure to be guided by considerations of public policy. Railroad officers must realize that there are conditions under which changes may be inopportune that might be unobjectionable at some other time; that they must avoid relatively unimportant but very irritating changes of existing practices, and that they must give more thought to considerations of public policy. On the other hand, it should not be assumed that railroad officers are doing nothing of this kind, as many of you know that we are preventing changes of this character when they are brought to our attention, and those of you who do know should not hesitate to inform your associates in your councils, so that an unfair or biased conclusion may not be reached.

Conscientious and competent railroad officers are stimulated by the initiative that is permissible under private management and are deeply concerned with the estimation in which they are held by the public. They realize that public opinion will hold them accountable for the fidelity and efficiency with which their duties are performed, and that railroad policy must, therefore, be subjected to the test of public approval. Therefore, they cannot over-estimate the importance of a constant study and supervision of every point of contact between the carrier and its patrons whether it be the politeness and attention of an individual employee; the considerate handling and prompt payment of a just claim; the furnishing of a car with the promptness required to meet the shipper's needs; or the correction of an inequality, injustice or discrimination in rate adjustment. Failures to fully meet your expectations will not be due to lack of effort, and you may be assured that each discovered imperfection will stimulate us to increased endeavor toward improvement.

The relations between the National Industrial Traffic League and the railroad officers should be conducted in a more direct and intimate way. If it be found that cars are not being released by shippers as promptly as might be, or not being loaded as fully as they might be, a direct or implied criticism from the housetops should not be necessary. Shippers fully realize that their own interest in conserving the supply of cars is really paramount, and the National Industrial Traffic League will be a ready and useful medium through which the facts may be conveyed to shippers, if brought to you in a more direct and intimate way. The railroads and the traffic executive committees which have been created will always welcome a direct expression from the National Industrial Traffic League with respect to any general policies that are being pursued or that may be under consideration, and they will do well to seek the counsel of such a representative organization.

The National Industrial Traffic League and the railroad officers of the country *must not drift apart*. Never has there been so much in common between the railroads and the users of the railroads, and their mutual co-operation is indispensable. If you will undertake on your part to perpetuate and strengthen this co-operation, I pledge you my support of your effort.

Express Contract Approved

WASHINGTON, D. C.

THE INTERSTATE COMMERCE COMMISSION has issued its decision upon the petition of the Association of Railway Executives and of the express company for approval of a proposed contract between the American Railway Express Company and common carriers by rail over the lines of which it conducts or may conduct transportation by express. The commission holds that the relations and arrangements proposed, in so far as they are embraced within the provisions of section 5, paragraph (1) of the interstate commerce act, are in the interest of better service to the public and will not unduly restrain competition.

The report says in part:

We are asked to approve and authorize a proposed standard contract, to be entered into by the express company and the several rail carriers and to continue in force for five years, with provisions for termination at the end of two and one-half years and for extension beyond the term of five years, to which the express company and a large majority of carriers represented by the petitioning association have given their assent. On July 28, 1920, we entered upon a hearing under section 5, paragraph (1), of the interstate commerce act concerning the propriety and lawfulness of the provisions of article V of the proposed contract.

Under the terms of a contract between the director general and the express company which became effective on July 1, 1918, to "continue during the full period of federal control" the express company was employed as the "sole agent of the government under the supervision of the director general of railroads to conduct the express transportation business upon all lines of railroad under federal control and upon such other systems of transportation or parts thereof as in the judgment of the director general it may be necessary or desirable to include." Upon the termination of federal control the terms of the contract, with such modifications as were required to meet the changed conditions, were in the main and with few exceptions continued in force pending the establishment of permanent contractual arrangements, it being agreed that the arrangements thus made would terminate on September 1, 1920, or at such other time as might be mutually agreed upon.

Under the terms of the transportation act, 1920, the express company was guaranteed against a deficit in operating income during the period of six months beginning on March 1, 1920.

The form of standard contract here proposed is intended to define the relations of the parties after expiration of that period, and its consummation is contingent upon a continued consolidation of the express companies referred to, which was approved by us on December 7, 1920, as well as upon our authorization under section 5, paragraph (1), of the interstate commerce act, of the grouping or pooling arrangements detailed in article V of the proposed agreement. It should be here noted that the intent of Congress that our power and authority to approve and authorize the consolidation of two or more carriers shall extend and apply to the consolidation of the express companies into the American Railway Express Company is definitely expressed by the language of paragraph (7), section 5, of the interstate commerce act. The statute further directs that "pending the decision of the commission such consolidation shall not be dissolved."

The purpose of article V of the proposed contract is to divide into groups the carriers over whose property the express business is to be conducted, and to deal with express transportation revenues and expenses by groups of carriers rather than by individual settlements *ab initio*. Railroads and other carriers over the lines of which the express company will conduct its operations are to be divided into three groups, denominated eastern group, southern group, and western group, respectively, "except as any line or lines may hereafter be assigned to a different group by the Interstate Commerce Commission in its grouping for rate-making purposes." In *Increased Rates*, 1920, 58 I. C. C., 220 decided since the filing of the petition herein, we designated and defined for the purposes set forth in section 15a of the interstate commerce act four groups, referred to as eastern, southern, western, and Mountain-Pacific groups. Under the proposed standard contract the grouping so designated will be observed.

The plan of dealing with express transportation revenues and expenses is summarized by petitioners as follows:

> After making the deduction for expenses by groups as particularly set out in the proposal, the balance remaining is to be distributed as follows: Two and one-half per cent thereof to the express company, and the remainder among the railroads in the group executing this form of contract in the proportion that the gross express transportation for the month earned on the line of each such railroad bears to the gross transportation revenue earned on the lines of all such railroads in that group for that month, with further provision as to the division between the parties in interest of so much of the above-mentioned two and one-half per cent as exceeds a given percentage of the value of the entire real property and equipment and other capital of the express company employed in express business, with certain exceptions.

Article V of the proposed contract provides that for each year in which it is in force during which the amounts set aside for the express company at 2½ per cent of the "income for division" in the several groups shall exceed 6 per cent of the average value of the entire real property and equipment and other capital of the express company employed in the express business, with specified exceptions, such excess of profit shall be divided, one half to the express company and one half to the other carriers, and that the one-half proportion of the profit thus accruing to the express company shall be accumulated by it until a sum equal to 10 per cent of the value of the entire real property and equipment and other capital of the express company then employed in the express transportation business and any increases thereof, with specified exceptions, shall have been reached, after which any such profit shall be divided in the ratio of one-fourth to the express company and three-fourths to the other carriers.

Counsel for petitioners submit that inasmuch as the article referred to proposes to deal with a substantial portion of the revenues of the railroads, as to which certain responsibilities and duties are imposed upon us, and that as the proposal is to deal with express transportation revenues and expenses, not by reference to individual carriers but by groups of railroads, approval by us of the proposed arrangement is prerequisite to the lawful execution thereof, especially by reason of the provisions of paragraph (1), section 5, of the interstate commerce act.

The question at the threshold is, whether the proposed contract embodies a pooling arrangement within the purview of section 5 of the act, to the lawful consummation of which our approval is an essential prerequisite. Counsel for the railroad petitioners is of the opinion that it does; counsel for the express company takes the opposite view. We concur in the view that the plan proposed is a pooling arrangement, prescribing the division of "net proceeds of the earnings of such railroads" otherwise than according to individual performance. The act in terms relates to such arrangements between "competing railroads," and an ascertainment that the arrangement "will not unduly restrain competition" is one of the necessary elements of an approval by us. While primarily the provision plainly has in contemplation independently operated railroad lines competing with each other in rates and services pertaining to freight traffic, the language is broad enough to include all operations productive of railroad revenues. The lawfulness of unified express operations over all railroad lines by one express company is established by other provisions of the act, and the applicability of the pooling provision of section 5 rests finally upon the question whether in the situation there is or could be as between the railroad lines a competition which article V of the contract might unduly restrain. While counsel for those lines contends that there might be competition in point of service, it is not entirely clear that there could be competition of any character. The only rates and services here considered are those of one carrier, the express company; the statutory right of a shipper to designate the routing of his traffic and the correlative duty of a carrier to observe his instructions come into play only where "two or more through routes and through rates shall have been established" and there is "a connecting line" to which the initial carrier can make delivery pursuant to the instructions.

Because of these questions, as to which there is room for doubt, and because of our views of the merits, we shall for present purposes proceed upon the assumption that article V of the contract is within the provisions of section 5 of the act.

While theoretical considerations support the view that the consolidation of carrier corporations will effectually remove the element of competition, those considerations are of slight value in the instant proceeding. For a considerable period of time prior to the incorporation of the American Railway Express Company the separate companies of which it is composed conducted, as has been said, more than 90 per cent of the express transportation business of the United States. Their operations were effectually blanketed over the entire country and embraced the rural districts as well as the large industrial points. Their services and rates were, for all practical purposes, welded into those of a single company under *In Re Express Rates, Practices, Accounts, and Revenues*, 24 I. C. C., 380. The companies were separate legal entities, but they were so intertwined and interlocked by stock ownership and otherwise that it was difficult to trace any one of the larger companies as either wholly independent in its management or in its relationship to indidivual railroads or systems. While, under the combination of circumstances recited, competition between the separate companies was reduced to a minimum, an element of potential competition of no slight importance was and must always be a factor in the plan under which the express business is conducted in this country.

We find that the proposed grouping and the division of earnings in the manner outlined will facilitate the conduct of the express business of the country, will be in the interest of better service to the public, will promote economy in operation, and will not unduly restrain competition. Adoption of the plan proposed will, furthermore, ameliorate the objectionable conditions referred to in *Increase in Express Rates*, 51 I. C. C., 263, 268, under which needed revenues of the express company may be secured only by the establishment of rates sufficiently increased to include substantial payments of the revenues thus derived to the lines over which the express business is conducted, whether or not reasonably required by those lines.

Under the provisions of section 5, paragraph (1), of the interstate commerce act approval and authorization of such division of earnings are conditioned upon assent by the carriers involved. Our finding, therefore, extends only to contracts with rail carriers that have assented or may hereafter assent to the proposed arrangement, and it is limited to the general plan embraced in article V of the proposed contract in so far as it comes within the provisions of section 5, paragraph (1), of the act.

With regard to the requested approval of provisions of the proposed contract, it does not rest with us to give or withhold approval further than as above under section 5 of the act. If the contract is entered into and controversies should arise between the parties thereto the courts constitute the forum in which they could and should be adjusted, and we, therefore, decline to express any opinion with regard to the particular provisions of article V or any other part of the contract.

An appropriate order approving and authorizing the proposed grouping and plan for division of earnings will be entered.

Commissioners Eastman, Aitchison, Woolley and McChord dissented.

THE CHICAGO, ROCK ISLAND & PACIFIC has appointed a general reclamation committee, of which C. A. Morse, chief engineer, has been appointed chairman, and is conducting a campaign among its employees for the conservation of materials. The committee is not only urging employees to save on new materials, but also that all articles in need of repair be gathered up and shipped to the shops and that all scrap be moved as well. Under the direction of the committee the system has been placarded with posters advertising the drive.

October Freight Traffic Statistics

WASHINGTON, D. C.

THE FREIGHT TRAFFIC handled by the railroads during October was slightly less than the record-breaking total for August, according to the statistics of freight car performance for that month just compiled by the Bureau of Railway Economics. The ton miles aggregated 42,562,685,000, which is 144,150,000 less than the total for August but greater than for any other month in railroad history and 2,218,935,000 greater than the total for October, 1919. October represents the fourth consecutive month, however, in which the total ton miles have exceeded 40,000,000,000 and the fourth consecutive month in which all records for the respective month have been broken. As the number of cars of revenue freight loaded in October was 4,979,377, which is greater than for any previous month, the fact that the ton mileage failed to make a new record is attributed to the large percentage of coal traffic which is subject to a shorter haul than general freight.

The average mileage per car per day, 28.5, was not only greater than for any previous month this year, but greater than for any month while the railroads were under federal control, having been exceeded only in May, 1917, when the average was 29 miles. In October, 1919, the average was 27.3 miles and in October, 1918, it was 26.2. The average carload, 29.9 tons, was slightly less than the average for August or September, when an average of 30.1 tons was attained.

The October summary is given below.

For the first time since the latter part of August the number of carloads of revenue freight loaded fell below that for the corresponding week of 1919 in the week ending December 18, according to the weekly report compiled by the Car Service Division of the American Railway Association. The total car loading for the week was 796,858 as compared with 806,734 in 1919 and 796,116 in 1918. During the preceding four weeks the number of cars loaded had fallen from 880,000 to 834,000. Decreases in loading as compared with the corresponding week of 1919 were shown for all classes of commodities except coal, coke and ore. The summary published by the Car Service Division is given below.

During the week of December 15 the surplus of freight cars increased to 103,849, an increase of over 29,000 cars in a week. Of the total, 79,943 consisted of box cars. The car shortage was further reduced to 12,377, about three-fourths of which were coal cars.

Region	Average miles of road operated	Net ton-miles (trousands)	Freight car miles (thousands) Total	Loaded	Per cent loaded to total	Freight cars on daily line Total	Unserviceable	Efficiency ratios Car-miles per day	Tons per car	Per cent of unserviceable cars
New England Region	8,155	1,139,504	66,328	45,039	67.9	115,457	10,531	18.5	25.3	9.1
Great Lakes Region	22,123	7,424,300	381,984	253,705	66.4	442,797	37,065	27.8	29.3	8.4
Ohio-Indiana-Allegheny Region	26,567	10,352,673	439,361	265,436	65.0	598,658	36,549	23.7	36.3	6.1
Pocahontas Region	5,339	2,617,919	99,987	60,105	60.1	88,688	7,253	36.4	43.6	8.2
Southern Region	37,723	4,910,724	264,471	175,757	66.5	275,884	21,814	30.9	27.9	7.9
Northwestern Region	47,401	5,808,058	312,518	210,368	67.3	342,714	26,948	29.4	27.6	7.9
Central Western Region	52,206	7,240,296	420,755	274,859	65.3	354,353	25,996	38.3	26.3	7.3
Southern Region	32,073	3,069,211	170,339	116,924	68.6	220,461	11,510	24.9	26.2	5.2
Grand total, all Regions	231,587	42,562,685	2,155,743	1,422,193	66.0	2,439,012	177,666	28.5	29.9	7.3

The percentage of home cars on home lines had increased by December 15 to 38.7 as compared with 35.5 on December 1 and 21.9 on March 1, when the roads were returned by the government.

IF THE LAW is wisely administered there is reason for believing that the managers will meet their obligations to the stockholders, the bondholders and the public; if the commission listens to politicians and habitual railroad baiters, railroad credit will be destroyed and the people will have unsatisfactory service.—*Providence Journal.*

REVENUE FREIGHT LOADED AND RECEIVED FROM CONNECTIONS

Summary—All Districts, Comparison of Totals This Year, Last Year, Two Years Ago. For Week Ended Saturday, December 18, 1920

Districts	Year	Grain and grain products	Live stock	Coal	Coke	Forest products	Ore	Mdse. L. C. L.	Miscellaneous	Total revenue freight loaded This year 1920	Corresponding year 1919	Corresponding year 1918	Received from connections This year 1920	Corresponding year 1919	Corresponding year 1918
Eastern	1920	5,647	3,756	57,404	1,986	6,345	3,344	44,095	65,804	188,381	.....	.....	231,991	.....	.....
	1919	6,267	4,404	48,925	4,289	7,082	1,292	33,213	93,364	.....	198,836	193,727	.....	217,901	238,198
Allegheny	1920	2,747	3,546	69,494	7,011	3,306	4,370	35,473	54,651	180,598	.....	.....	125,859	.....	.....
	1919	2,897	4,136	46,976	4,400	4,158	2,459	40,803	62,849	.....	168,678	181,521	.....	114,236	172,219
Pocahontas	1920	104	116	22,024	404	1,936	136	2,478	5,230	32,428	.....	.....	16,214	.....	.....
	1919	186	175	23,693	491	2,178	334	172	9,039	.....	36,268	31,746	.....	15,937	19,609
Southern	1920	2,827	2,005	31,820	1,008	15,863	2,130	35,922	32,406	123,981	.....	.....	67,796	.....	.....
	1919	2,900	2,827	27,708	249	17,484	2,438	20,200	53,419	.....	127,225	112,115	.....	75,629	67,903
Northwestern	1920	11,224	8,630	8,773	1,409	10,387	1,392	25,059	23,709	90,583	.....	.....	45,611	.....	.....
	1919	10,793	10,125	12,293	559	10,137	1,539	19,638	32,253	.....	97,337	114,048	.....	48,114	73,983
Central Western	1920	9,544	10,461	26,450	392	3,622	2,217	28,092	35,466	116,244	.....	.....	52,702	.....	.....
	1919	10,790	13,669	23,503	449	4,280	2,538	21,528	42,222	.....	118,979	108,091	.....	55,625	58,348
Southwestern	1920	3,412	1,956	7,188	540	7,167	538	15,878	27,964	64,643	.....	.....	46,926	.....	.....
	1919	3,711	3,161	5,809	572	6,429	581	14,417	24,731	.....	59,411	54,868	.....	49,328	42,273
Total all roads	1920	35,505	30,470	223,153	12,750	48,626	14,127	186,997	245,230	796,858	.....	.....	587,099	.....	.....
	1919	37,544	38,497	183,907	11,009	51,748	11,181	149,971	317,877	.....	806,734	.....	.....	576,770	.....
	1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	796,116	.....	.....	672,533
Increase compared	1919	.....	.....	34,246	1,741	.....	2,946	37,026	.....	.....	.....	.....	10,329	.....	.....
Decrease compared	1919	2,039	8,027	.....	.....	3,122	.....	.....	72,647	9,876	.....	.....	.....	.....	.....
Increase compared	1918	.....	.....	.....	.....	.....	.....	.....	.....	742	.....	.....	.....	.....	.....
Decrease compared	1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85,434	.....	.....

L. C. L. Merchandise loading figures for 1920 and 1919 are not comparable, as some roads are not able to separate their L. C. L. freight and miscellaneous of 1919. Add merchandise and miscellaneous columns to get a fair comparison.

December 11	1920	36,820	31,799	230,396	13,904	51,194	17,673	193,143	259,968	834,897	761,940	820,202	614,178	596,785	683,649
December 4	1920	37,109	30,903	230,228	15,643	53,971	27,195	195,571	281,542	872,162	789,286	837,806	605,876	589,350	657,758
November 27	1920	33,922	29,844	205,985	14,338	50,154	31,445	173,958	258,027	797,673	739,197	735,628	604,966	611,793	641,479
November 20	1920	36,442	40,427	216,322	13,259	54,760	37,009	199,922	282,387	880,528	854,601	857,377	605,306	629,259	685,145

Labor Turnover—Not a Disease But a Symptom

Locating and Removing the Causes Will Greatly Increase the Efficiency of the Railroads

By J. C. Clark
Assistant to General Manager, Oregon Short Line

"WHAT IS YOUR LABOR TURNOVER?" If this question were put to most railroad executive officers, they would be forced to answer, "I do not know." Yet conditions which cause labor turnover are the most vital in the safe and economic operation of a railroad.

What first started me thinking about labor turnover was the large number of new men coming into the service. Before these men could be fully trained in the performance of their duties, a considerable percentage of them had left the service and other new men had taken their places. The fact that so many men had to be employed had a demoralizing effect upon the older men in the service. The result was an increased number of accidents and personal injuries, increased freight claims, and a general slow-down of operation. It takes time to educate men in railroad work. If new employees will not stay with their jobs long enough to learn them thoroughly, it is apparent that an efficient organization cannot be built up.

Why Do Men Leave the Service?

"But why do men leave the service?" When I began to investigate this question, I found that in most cases we had no information whatever, and the meager information available had not been compiled so that it could be used. I have made diligent inquiry of a good many railroads and I have yet to find one that is compiling information on labor turnover and rendering reports regularly.

By examining the headings of the labor turnover report form which accompanies this article the uses to which this report can be put become apparent. In column 1 will be listed the various departments or units between which the comparison is to be made. For example, all shops on a railroad could be listed, and the turnover for each shop could thus be easily compared with the others. The same thing could be done for all large stations, for roadmasters' districts, for divisions, or any other sub-division that it is desirable to make.

Columns 2 to 7, inclusive, are to indicate the permanency of the organization. For example, a certain shop might show a labor turnover of 30 per cent for one month, and still show that 90 per cent of the employees in that shop had been employed there for one year or over. This would indicate that 10 per cent of the employees were changing three times in one month. This again would indicate that there must be some aggravated circumstance or condition, probably in some one department, that was causing this excessive turnover. An investigation could then be made to determine the cause, and in many cases a remedy could be easily applied. Column 8 is the total number of employees on the first day of the month. The figures in this column would be used in determining the average employees for the month as a basis for the percentage of turnover.

Columns 9 to 13, inclusive, classify the different means by which employees enter the service of the department or unit under consideration. Column 14 is a total of these entrances.

Throwing Away the Company's Money

Columns 15 to 22, inclusive, classify the causes for discharges. When these causes have been subjected to thorough study and comparisons have been made between various units, there is no doubt that the headings will be changed. When any employee is discharged without sufficient cause, the employer loses a very definite asset. The employee's place often has to be filled by a new man, and it takes time and money to break in a new man. Unjust discharge starts trouble at once with the labor organization, and does more than any other one thing to create suspicion and lessen confidence between the employer and employees. If the turnover report should indicate an excessive number of discharges in any unit, the matter should be thoroughly investigated and it will more than likely be found that some one man in a supervisory capacity has found it easier to discharge men than to work with them and develop his organization, being blind to the fact that he is making his own job harder and throwing away the company's money.

Columns 24 to 29 should show the reasons why men quit. At present, the railroads of the United States are not even attempting to get this information. Still, it is an important factor in building up an organization and will undoubtedly indicate what can be done to lessen the number of resignations. This information could be obtained in most cases by requiring every man who resigns to have an interview with the employing officer before he can get his time check. No doubt the information thus obtained would not in all cases be correct, but if the man is approached in the proper manner, it will be correct in 99 per cent of the cases. The supervising officer cannot get this information because in a great many cases, it will be found that the employee is resigning because of dissatisfaction with conditions over which the foreman has direct control or because of personal reasons involving the foreman or supervising officer. For this reason, the employee who is quitting will not tell the truth to the supervising officer when leaving the service. If this in-

								ENTRANCES						EXITS																												
														DISCHARGES										QUITS							OTHER CAUSES														
	% 5 YEARS AND OVER	% 3 YEARS AND OVER	% 2 YEARS AND OVER	% 1 YEAR AND OVER	% 6 MONTHS AND OVER	% 3 MONTHS AND OVER	TOTAL 1st. DAY OF MONTH	EMPLOYED	RE-EMPLOYED	TRANSFERED	PROMOTED	RE-INSTATED	TOTAL COL. 9 TO 13 INC.	APPLICATION NOT APPROVED	QUITTING ON SHORT NOTICE	UNSATISFACTORY SERVICE	ABSENT FROM DUTY WITHOUT PERMISSION	VIOLATION OF RULES	RESPONSIBILITY OF ACCIDENT	EXCESSIVE DEMERITS	OTHER CAUSES	TOTAL COL. 15 TO 22							PENSIONED	REDUCTION OF FORCE	TRANSFERED	PROMOTED	DECEASED	TOTAL COL. 31 TO 35	TOTAL COL. 23+30+36	TOTAL IN SERVICE LAST DAY OF MONTH COL. 8+14-37	AVERAGE IN SERVICE FOR THE MONTH COL. 8+38÷2	PER CENT TURNOVER COL. 37÷39	PER CENT UNDESIRABLE TURNOVER COL. 30÷39	PER CENT UNDESIRABLE TURNOVER LAST YEAR	ESTIMATED COST PER UNIT	TOTAL COST COL. 30 X 43	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

Labor Turnover Report Form

formation is to be obtained in a reliable form, it must be handled by some outside agency and this should be the employment department.

Columns 31 to 35 need little or no explanation, although a great deal of discussion has taken place as to various features in connection with these causes. The employee who is pensioned has spent a great many years in the company's service, and there is no question that in nearly all of these cases the company has regained all of its investment through the long and faithful service of the employee. Because of this some authorities contend that terminations or exits of this character should not be considered in computing the total cost of labor turnover. Other authorities point out that regardless of this fact, a new man has to be trained to take the place of the pensioned employee and they therefore insist that terminations of this character should be included in computing the total cost. This matter, however, is one largely of personal viewpoint and is not vital.

As to whether or not the exits listed under reduction of force should be considered in computing the total cost of labor turnover depends largely upon the reasons for reduction of force. When a piece of construction work is completed, it is usually absolutely necessary to let a large percentage of the laborers go. Likewise, in other kinds of seasonal work, when the season ends or the work is completed, it is necessary to lay off a large part of the laborers. If reduction of force is occasioned by a temporary lull in business, every effort should be made to retain as many men as possible in the service, and transfer them to other departments where possible in order to keep in direct touch with them. A great deal can be done in this direction if the employment service is properly organized, and it will mean a great saving to any company that follows it up.

Transfers may likewise be desirable or undesirable. If an employee requests to be transferred because he is lazy and desires a soft job, it would be better to let him go entirely. On the other hand, if the employee desires a transfer to another department where he will have greater chances for advancement or where he will be better satisfied with his work, the transfer is desirable and should be encouraged. In some instances, it may be necessary for the company to transfer individuals or groups from one department or division to another in order to help out on emergency work. Transfers of this class are usually temporary and are often absolutely essential.

Column 38 is the total number of employees on the last day of the month. This figure is obtained by taking the number in service on the first day of the month, adding the number of entrances for the month, and subtracting the number of exits. In order to obtain the average for the month, which is shown in column 39, add the number of employees in service the first of the month and the last of the month, and divide by 2.

Labor Turnover Defined

In discussing the per cent of turnover to be shown in columns 40 and 41, it is necessary to give a definition of labor turnover. Most authorities agree that labor turnover is the change which takes place in an organization's working force due to all terminations of employment regardless of cause, and the study of labor turnover takes into consideration the study of the causes and effects of all such terminations of employment and the means of preventing such terminations as are undesirable. Labor turnover is measured in terms of the ratio of those who leave their employment in a given period to the average number who have been on the active payroll during the same period.

Railroad officers have not made any intensive investigation or study of labor turnover, and, as stated before, do not even know what it is and therefore we have no experience to guide us except the experience of industries where the problem is quite different from that of the railroads. It is evident, however, that at least some part of the labor turnover is desirable. Another part is undesirable but unavoidable. There is no doubt that a record should be kept of the total labor turnover so that comparisons can be made between different units and between the same unit for different periods. I am not so certain, however, as to what is desirable and what is undesirable turnover. Most authorities on this subject do not attempt to make any distinction between desirable and undesirable, or avoidable and unavoidable turnover. It seems to me, however, that this is necessary in railroad work. It will require additional investigation and experience, however, to determine whether or not it is practical to make such subdivisions.

Cost of Labor Turnover

Only one feature of this labor turnover report form remains to be discussed. That is, the cost. Every practical railroad man I have talked to with regard to this matter agrees that there is a very definite cost in breaking in new men, whether they have had previous experience or not. When it comes to estimating this cost, however, a serious problem arises because there are so many elements that enter into it. A few of these elements are:

First—The cost of hiring, which includes employment office expense and any other expense incident to placing a new man on the job.

Second—The cost of training, which includes the value of the supervising officer's time spent in instructing a new hand. It also includes the wages paid the new man in train, engine yard, or telegraph service until such time as he takes a regular place on the crew or in the office. Some roads do not pay any wages to student firemen, brakemen, or yardmen, but other roads do.

Third—The extra labor cost. It has been found that the new employee never performs a normal amount of work the first few days on the job. The length of time required for the new man to bring his labor output to normal depends largely on the class of work upon which he is employed. On account of this subnormal production of the new man additional force is required. The cost of this additional force is very properly chargeable to labor turnover.

Fourth—The cost of extra power, lubricants, and materials caused by reduced output. This item applies only to the shop crafts. It is evident that if full output is obtained from every machine operated, it would not be necessary to run so many machines or they could be operated for a shorter number of hours. Every new employee who is unable to get normal production from the machine he is operating makes it necessary to operate the machine just that much longer or else to operate more machines.

Fifth—Interest, depreciation, insurance, taxes and repairs on additional plant investment, made necessary because of the lessened output caused by the turnover.

Sixth—The cost of work spoiled by new operatives in excess of the normal rate of spoilage by workmen experienced in the operation.

Seventh—Greater wear and tear on machinery, which includes the greater cost of repairs due to breakage and the greater depreciation due to hard usage, caused by the inexperience of the operative and the necessity of running machinery a longer period in order to obtain the given output.

Eighth—Increased cost of accidents and claims resulting from accidents, due to greater accident frequency during the learning period. This item would also include freight claims due to improper handling of freight by new employees.

Ninth—Last and probably the hardest to estimate is the loss of good will, due to inefficient service provided for shippers and the travelling public on account of inexperienced employees. While this item is largely intangible, it is at the same time very real, and will have a great deal to do with

the success or failure of railroads under private operation.

It will be apparent that in order to obtain an estimate of these various elements of cost, a very thorough investigation will have to be made by a committee of experts in each department. In fact, it should be carried on under the direction of a personnel department, organized to handle the personal element.

In closing, I wish to quote a paragraph from "Personnel Administration" by Tead and Metcalf. "The logical necessity of centering attention in industry upon the effectiveness with which human labor is applied, has been the basic cause of a shift of managerial emphasis which has really only begun. Industrial management is thus far little beyond the threshold of a new method and a new evaluation of administrative ability. The new focus in administration is to be the human element. The new center of attention and solicitude is the individual person, the worker. And this change comes about fundamentally for no sentimental reasons, *but because the enlistment of human co-operation, of the interest and good will of the workers,* has become the crux of the production problem."

Labor turnover is only a symptom or an indication of where labor dissatisfaction exists, and a clew to the extent of such dissatisfaction. The cause and the remedy must be determined by thorough investigation and this investigation must deal largely with the individual person, the worker.

Review of the Railroad Situation for the Year

By Thomas De Witt Cuyler,
Chairman, Association of Railway Executives

THIS IS THE RECORD YEAR of American railroad operation. Not only has a larger gross tonnage been moved than ever before, but new records have been established in the amount of transportation gotten out of each car. Even during the war year of 1918 the highest performance was 494 ton miles per car per day, while for August, 1920, the average was 557, and for September and October, 565.

In the nine full months since the Government turned back the railroads to their owners on March 1, the railroad companies under private operation have:

1. Increased the average movement per freight car per day 6.3 miles—from 22.3 to 28.6 miles.
2. Increased the average load per car 1.7 tons—from 28.3 to 30 tons.
3. Made substantial reduction in the number of unserviceable locomotives.
4. Reduced the accumulation of loaded but unmoved freight cars from 103,237 on March 1, to 21,991 on December 3, of which only 6,386 were detained because of the inability of the railroads to move them.
5. Relocated approximately 180,000 box cars from the east to the west for the movement of farm produce.
6. Relocated approximately 180,000 open top cars from the west to the east to keep up the production of coal.
7. Moved the third highest coal production in the history of the country.
8. Spent over $500,000,000 extra on improving the maintenance of tracks, bridges, cars and locomotives.
9. Contracted to spend about $250,000,000, largely out of earnings, for additions and betterments to promote the movement of cars.
10. Made arrangements to purchase approximately 50,000 new freight cars, 1,500 new locomotives, and 1,000 new passenger cars.
11. Begun the reconstruction of thousands of old cars.
12. Moved—with a deteriorated plant, under disturbed labor and business conditions—the largest volume of traffic ever known in a single year, with the highest efficiency yet achieved, and with a minimum addition to the value of the property on which the public has to pay a return through rates.

When the railroad companies resumed operation of their properties on March 1 an unusually large number of cars and locomotives were in bad order; the stress of war conditions had compelled their use in a most intensive manner, and the time was at hand when much of the rolling stock was due for thorough repairs; a very small proportion of the cars of any road were on its own lines; equipment was badly distributed with reference to the needs of traffic; there were no stocks of coal left over from the preceding year; a vast amount of grain remained on hand from 1919; and a volume of business was being offered which seemed beyond the ability of the railroads to move.

In addition, railroad labor was in an uneasy and dissatisfied frame of mind. The railroads inherited pending wage demands amounting to approximately $1,180,000,000, and while every effort was made by the railroads to bring the wage question to a satisfactory conclusion through the U. S. Railroad Labor Board, outlaw strikes developed in April which produced effects wholly disproportionate to the number of men ceasing work.

Commissioner Aitchison's Comment

Interstate Commerce Commissioner Aitchison, who has been in direct charge of car service matters for the Interstate Commerce Commission, has said:

"The condition in the spring of 1920 was more menacing to the domestic welfare of the country than it was in the early winter of 1917 when Federal control was assumed. But the situation was met, squarely and courageously in a business-like way, without political interference or pressure of any character whatsoever, under the orderly processes of law, by privately operated railroads, directed along consistent lines to secure that unity of object and policy which was the end sought in placing the carriers under Federal control during the war."

The annual report of the Interstate Commerce Commission filed with Congress on December 9 states:

"Comparing August, 1920, with August, 1919, the increased mileage had the effect o increasing the car spuply 287,694 cars; the increased tonnage per car had the effect of increasing the car supply approximately 104,942 cars."

The railroad companies have manufactured increased transportation capacity, not out of new cars and locomotives, but out of increased efficiency. If the enlarged capacity provided by the companies during the past nine months had had to be produced by new cars and locomotives, it would have required the expenditure of approximately $2,000,000,000, a sum of money which would have been permanently added to the property value of the railroads, on which the public would ultimately have to pay a return through rates.

In avoiding the expenditure of this $2,000,000,000 or any substantial portion of it; in increasing the efficient use of our present facilities; and in restoring the orderly flow of commodities, the railroads have made a great contribution toward bringing about more normal economic conditions, and have fully met their responsibilities in this period of national readjustment.

For this result, however, the railroad companies do not take sole credit. The help of shippers in promptly loading and unloading cars—using Sundays and holidays as well as week-days—and the day-and-night, rain-or-shine work of hundreds of thousands of railroad employees in placing and removing those cars and in keeping them moving when once loaded, are gratefully appreciated.

It is the earnest hope of the railroad companies that this will be a national object lesson in the value of co-operation, and will lead shippers, railroad employees, railroad executives and the general public to pull together for an even better showing in 1921.

Higher Rates Not Expected

The statement is being made in various quarters that the railroads will shortly seek a further increase in rates. I know of no movement on the part of the railroads for a

general increase in rates, nor do I expect any. It is true that the railroad companies are not yet receiving from the increased rates anything like the 6 per cent return needed. But the railway executives realize that they are trustees of a great public interest in the reduction of railroad operating expenses to the lowest possible figure, and every effort will be made during the coming year to accomplish this by further economies and efficiency.

Private ownership and operation of railroads as a measure of sound public policy rests largely upon its superior efficiency and economy. In my judgment the American railroad companies during the present year have fully justified, and during the coming year will make every effort to continue to justify, the support and confidence which public opinion in gratifying measure has already accorded them.

Living Conditions of Trainmen Who Lie Over at Railway Terminals

THE INTERSTATE COMMERCE COMMISSION has submitted a report in response to a Senate resolution of January 16, 1920, upon living conditions of trainmen who are compelled to lie over at railroad terminals.

By a resolution adopted on January 16, 1920, the Senate directed the commission to investigate and report upon living conditions of trainmen who are compelled to lie over between trips at terminals of railroads, and also to investigate the feasibility on the part of railroad companies of furnishing to their men accommodations suitable to their needs at such terminals.

In compliance with the terms of this resolution, the commission, on January 29, instituted an investigation concerning the nature and extent of facilities, including buildings, rooms, food, and other accommodations, which are provided by railroad companies for their train-service employees who are compelled to lie over at terminals between trips, the plans, if any, for improving and extending these facilities, and if accommodations are not provided or existing facilities are not adequate the feasibility of providing such accommodations or extending existing facilities.

The information collected, which has been classified and tabulated, is appended to the report. Appendix A contains data furnished by the railroad companies listed therein concerning accommodations provided by them for their employees, together with information furnished as to the necessity and feasibility of increasing existing accommodations. Appendix B contains a list of railroad companies who have provided no living accommodations for their employees lying over at terminals between trips, together with reasons therefor which have been stated by the carriers. Appendix C contains data furnished by the Railroad Young Men's Christian Association relative to conditions at railroad terminals, as well as the facilities and equipment provided at certain of these terminals.

"Briefly summarizing these reports," the commission says, "481 carriers have furnished information in response to the request of the commission; by 164 lines or systems covered by these reports, living accommodations of some character are provided for train-service employees lying over at terminals; while on 317 lines for which reports have been received no such accommodations are furnished.

"The reports which are tabulated in Appendix A indicate extreme differences in living accommodations provided for employees lying over at terminals on the lines reporting such facilities. These accommodations in some cases consist merely of a shelter of the simplest form, such as box-car bodies removed from their trucks, provided with wooden bunks, without bedding or other facilities of any sort, and which the employees who use them are required to maintain and clean; on the other hand, on some roads there are completely equipped dormitories and clubhouses provided with modern facilities. The accommodations in general are of many forms, varying between these extremes.

"As shown by the tabulation in Appendix B, of the companies reporting that no living conditions are provided, 255 report that trainmen lie over only at home terminals on these lines and that the provision of living accommodations by the companies is unnecessary. Other reports merely indicate that no living accommodations are furnished by the carriers, no reasons or circumstances being stated.

"The Railroad Young Men's Christian Association has furnished information relative to 679 railroad terminals; the facilities and equipment provided at certain of these terminals are indicated in the tabulation in Appendix C.

"In addition to the requests for information in the matter which were made upon the carriers, similar requests were also addressed by the commission to the chief executive officers of the four organizations of train-service employees, namely, the Brotherhood of Locomotive Engineers, Brotherhood of Locomotive Firemen and Enginemen, Order of Railway Conductors, and Brotherhood of Railroad Trainmen. No response was received from three of these organizations; the Brotherhood of Locomotive Firemen and Enginemen furnished certain data which have been given due consideration.

"As to the 'feasibility on part of railroad companies of furnishing to their men accommodations suitable to their needs at such terminals,' this is altogether a local and financial question. If suitable and adequate accommodations are available and accessible at a terminal, such as boarding and rooming houses, restaurants, and hotels, there is no apparent necessity for similar accommodations to be provided by the railroad company. But in view of the necessity, particularly from the standpoint of safety in railroad operation, for train-service employees to procure proper as well as adequate rest, in order that they may be alert at all times while on duty, the provision by the railroad companies of suitable and readily available facilities to enable their train-service employees to secure a proper rest is required at many terminals. Some of the facilities provided, particularly sleeping quarters, obviously are not "suitable to their needs." A bunk house, which is not provided with necessary bedding, the maintenance of which is not assigned to an attendant who is held responsible for its condition, and which is supposed to be cleaned by transient occupants, ordinarily does not long remain in sanitary condition necessary for securing proper rest; and it is considered unreasonable to expect train-service employees, particularly enginemen, to carry bedding with them. These are conditions which should be voluntarily corrected by the railroads themselves. Dormitories, clubhouses, and other similar facilities, properly equipped and maintained, undoubtedly add materially to the efficiency of the men using them, and the provision of such facilities by railroad companies whose employees lie over at terminals away from their homes, where other suitable accommodations are not adequate or available, is highly commendable. The working hours of train-service employees in common practice are in the great majority of cases irregular at best, and improvement in accommodations and facilities which are conducive to trainmen securing proper rest should be systematically pursued by the carriers and encouraged in every practicable manner."

THE WESTERN SOCIETY OF ENGINEERS, Chicago, will devote Friday evening, January 14, to the consideration of timber preservation, at which time John Foley, forester of the Pennsylvania System, will present a paper on "The Tie Supply of the Future."

Observations on a Transcontinental Journey

The Importance of Good Passenger Service in Retaining the Good Will of Shippers and the Public

By William S. Wollner

PRIOR TO THE COMMENCEMENT of a transcontinental journey that included 7,000 miles over six of the country's principal trunk line railroads, the author of this article interviewed many of the leading shippers and receivers of freight in his home territory to learn their attitude with reference to freight rates and service. Every merchant and manufacturer whom he interviewed expressed a sympathetic attitude toward the nation's transportation system and a recognition of the problems that railroad management is striving to solve. These interviews disclosed an understanding upon the part of business men of the necessity for increased freight rates and the spirit to see that the facts were properly understood by the public at large.

While freight moves less rapidly than four or five years ago and deliveries are somewhat less certain, improvement in this respect since the return of the roads to private ownership was recognized and appreciated. All in all there seemed to be a general understanding of why the railroads were not giving 100 per cent freight service in accordance with the demands of the moment and a disposition to assist them in their efforts to re-establish this service.

The transcontinental trip which these interviews preceded disclosed an entirely different attitude of mind in the casual traveler and the man who is required to spend much of his time on railroad trains. Passengers on practically all the roads traversed were outspoken in their criticism of individual cases of what they considered inefficiency or a failure in the passenger carrying machine. Although most of the matters mentioned were the result of incompetency or lack of consideration on the part of an individual employee, criticism was aimed at the transportation machine as a whole. This attitude was so utterly at variance with that expressed by shippers and receivers of freight (and it was noted that many of the critics were as a matter of fact large shippers and consignees) that it could not fail to impress itself on one's mind that while the individual will look charitably upon the shortcomings of the railroads where he is not personally inconvenienced he is prone to charge every personal inconvenience suffered by him to a failure of the transportation machine as a whole.

If this is a fact, railroad management can well afford to give special attention to making passenger transportation a major study in its effort to retain the public's confidence in the ability of private ownership and operation to meet the nation's transportation needs. It is for this reason that the author feels justified in presenting herein a synopsis of the things most frequently and bitterly complained of.

Maintaining Schedules

As to both comparatively short journeys and long ones, the public demands that passenger schedules be maintained. Although the railroads seem to be making an especial effort to shorten the elapsed time between terminals, this does not seem to be as much the result of a demand on the part of the public as it does of the roads to compete with each other for business. With especial reference to long trips, that is, upward of 1,000 or 1,500 miles, there seems to be less demand on the part of the public for the cutting down of present schedules than for the assurance that if a trip is undertaken that the schedule may be depended upon.

Continual complaint was heard of trains dropping behind their schedules en route, even though they arrived at their terminals on time. These complaints emanated from persons traveling to terminals as well as those leaving them at intermediate stations. This was largely due to the traveler having very little to do en route other than to check up the performance of the train on which he is riding. It was noted in many cases that when a train was an hour or two late, passengers' comment would indicate that they expected to arrive at terminal at least that late. This suggests the desirability of Pullman conductors and other train employees informing passengers that although the train is sometimes behind its schedule, in most cases the lost time is recovered before the terminal destination is reached.

Sleeping Car Service

During federal operation of railroads or perhaps prior thereto, a practice grew up in many ticket offices of accepting "tips" for desirable Pullman transportation. In offices in some large cities it was practically impossible to obtain a lower berth, compartment or drawing room without paying the ticket clerk a premium therefor. Unaccompanied women, and women traveling with children, were compelled to resort to bribery in order to secure desired accommodations. In addition to this form of bribery there seems to be uncertainty in many ticket offices as to just what accommodations are available.

As an instance, a man telegraphed for sleeping car accommodation to a junction point two days in advance of his arrival there. Upon arrival at this junction point he was informed by the ticket clerk that there were absolutely no accommodations available on this particular train. He nevertheless boarded the train and found a Pullman car with only two other passengers in it. A woman traveling from the Atlantic to the Pacific Coast was informed at the ticket offices in three cities (the trip was not continuous) that there were no lower berths available and was then able to secure them upon "tipping" the clerk. Needless to say, passengers, while not believing that this practice is countenanced by the railroads, do believe that it could be stamped out if the railroads were minded to do so.

There was some complaint as to the attitude of porters toward passengers, but the principal complaint was as to misinformation given by ticket clerks and the need for bribing them in order to secure desired accommodations.

Dining Cars

From the viewpoint of the casual traveler as well as of the man who must spend much of his time on a train, the railroad dining car service is a failure inasmuch as it fails to serve an adequate meal for a reasonable price. It may be said that from a railroad point of view, or at least from that of some railroad managements, the dining car service is a failure because owing to the limited patronage and expense of operation, it fails to pay a return on the operating cost. It would be interesting to know what proportion of persons traveling on a given train are accustomed to having at home the standard of service and the "fancy" dishes served in the average dining car.

It was probably true some years ago that a large number of the persons traveling on de luxe trains to which dining cars were attached, were accustomed to the standard of serv-

ice maintained in the diner, but it is doubtful if this is true to-day, particularly on trains carrying tourist cars and coaches in addition to standard sleepers. As a matter of fact, more people in standard sleepers are to-day carrying food with them for both long and short journeys than ever did before. Unquestionably, most of the people traveling in tourist sleepers and chair cars do not use the diners because of the high standard of service to which they are not accustomed and the cost of the food served. If there is a relation between the quantity of the food served and the expense of operation, it would seem advisable to supply the plainer kinds of food with a simpler service, thus enlarging the number of patrons by drawing upon the tourist and chair cars as well as making patrons of all of the passengers in standard sleepers and parlor cars.

As an illustration: It was noted on a certain road which served "club" meals at a comparatively reasonable cost that not only were patrons drawn from all classes of equipment but that the 36-chair dining car was operated by a crew of seven consisting of a steward, three kitchen men and three waiters, whereas the dining cars on the other two roads traversed by this train and in which à la carte service was given exclusively, dining car crews of nine were required to handle 30-chair dining cars, that is, crews consisting of a steward, three kitchen men and five waiters. There was general complaint on all the roads covered of the quality of food and service even though, as stated herein, an effort was made to give far better service and fancier food than the average traveler is accustomed to having in his home. It is unquestionably a fact that the ordinary traveler would prefer plain wholesome food in sufficient quantity at a reasonable price with fancy dishes and other furbelows omitted.

Safety

So long as accidents do not occur, travelers and those contemplating traveling give little thought to their personal safety while en route, but as soon as accidents do occur, they immediately brand them the result of inefficient management.

In the trip from the Atlantic to the Pacific seaboard, the trains on which the author traveled were involved in three accidents two of which might have been serious in their consequence and all of which occasioned considerable criticism of railroad management on the part of passengers. The first accident was on one of the country's best known and most successfully operated properties. Some portion of the water elevating apparatus under the locomotive tender engaged an oak crossing plank that was said to have been 4 in. by 10 in. by 16 ft. The engine ran probably a mile before being stopped and the plank was broken up into small pieces, completely destroying the tender brake rigging, the tender scoop braces, etc. It was quite remarkable that the tender did not leave the rails. As a result the train reached its terminal two hours late.

A minor accident which did but little damage but which caused a great deal of comment among passengers was when a coupler slipped between a sleeping car and a dining car coming into a train-shed permitting the train to part and breaking air and steam hoses and tearing off vestibule curtains. The train came to a somewhat violent stop when the air hose parted, which drew the attention of the passengers to this accident.

The cause of the third accident was a section crew pushing a motor car from the section house onto the track directly in front of an approaching train running at a speed probably in excess of 60 miles an hour. The motor car was smashed into small bits; the pilot of the locomotive was entirely destroyed, air piping was damaged in such a way that the engineer lost control of his brakes and the water hose between tender and locomotive was broken off so that the entire contents of tank ran out onto the ground. The train ran probably 3,000 ft. before it stopped and was delaved several hours until a relief engine was secured. Fortunately, in this case also not a wheel left the rail.

If for no other reason than the effect that safety of operation has upon passengers, the railroads should continue and enlarge upon their safety work.

Conclusion

It is the belief of the author that private ownership and operation of railroads in the United States will stand or fall upon the belief of the public as to its efficiency. In other words, that the belief of the people rather than the actual fact of efficiency or inefficiency will be the controlling factor. Further, that the public when divided into individuals is far more concerned in the convenience and safety of passengers than in the adequacy of freight transportation. Therefore, it would seem as if railroad management should give considerable thought to the providing of a passenger transportation service that will serve to convince the public of the success of private operation of the railroads and the wisdom of continuing it.

A Means of Protecting Grade Crossings

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is giving serious consideration to means of preventing collisions between automobiles and trains at grade crossings. On this road, which operates 1,250 miles of line, trains collided with 74 automobiles and 22 other vehicles, killing nine persons and injuring 53 seriously during the year ending May 15, 1920, while from March 1, 1920, to September 1, of this year, 29 automobiles and 9 other vehicles were struck in this manner. In an effort to prevent accidents of this character the general counsel of that road has prepared a law which it is proposed to have introduced into the coming session of the Tennessee legislature, providing for the installation of humps or other speed restriction devices, under the direction of the State Highway Commission, on all grade crossings of railroads within the state not already adequately protected. The plans for this protection have been developed under the direction of Hunter McDonald, chief engineer, who presented an outline of them before the American Association of Highway Officials in Washington, D. C., on December 16.

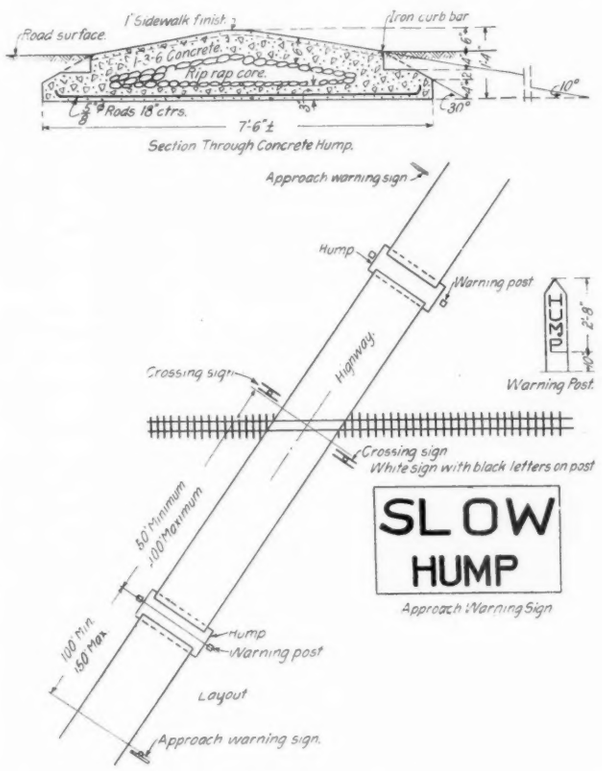
In this paper Mr. McDonald stated, in part, that their investigation shows that grade crossing accidents occur under two conditions. (1) The driver of the car is aware of the presence of the train on the track and deliberately races to beat it across. (2) The driver of the car is paying no attention and does not slow up at the track, nor look and listen. A law in Tennessee, passed at the last session of the Legislature, requires that every driver of an automobile or other motor vehicle shall stop before crossing a railroad track.

"Watchmen, wigwag signals, alarm bells and even safety gates are often ineffective in preventing men from recklessly sacrificing or jeopardizing their own lives and those of their children and friends by what is often nothing less than criminal carelessness. We have had instances where cars have collided with coaches of the train after the engine and several cars have already passed over the crossing. We recognize that separation of grades is the only absolute remedy, but this is a slow, tedious and expensive process, involving always the question of the equitable distribution of the costs of the work and the raising of the necessary funds. Whatever funds the railroads may have at their command in the early future are already badly needed to place and keep their properties in condition to move their traffic safely and promptly.

"Electric appliances, such as gongs and wigwags, when out of order are a decided menace at that very moment, inviting

the driver to cross in fancied security, although a train may be approaching. Any small boy with a piece of wire or a dragging part of equipment, can short-circuit the apparatus and give a false clear signal. It is almost impossible to keep such apparatus always in working order, and, even when working, their warnings are often disregarded.

"For a number of years I have been observing the operation of so-called 'Humps,' which have been installed at grade crossings on many of the highways and on the speedway of the parks in the city of Memphis. The secretary of the Park Commission of Memphis, under whose direction the humps have been installed and operated for eight years past, recently wrote our general counsel that no crossing accident had taken place since they were erected. He states that in one instance the driver of a machine running at a speed of about 25 miles an hour, was thrown out of the car and his arm broken. Suit was brought against the city, but the city won on the ground that a warning sign had been placed at a



sufficient distance in advance of the hump to enable the driver to slow down.

"We believe, that pending the consummation of the ideal, grade separation, a forceful speed deterrent is absolutely essential, and that persuasive methods are of no avail. No law limiting the privileges of the individual can be effective unless applied by force. We are convinced that the hump affords the least oppressive means of applying the force necessary to secure the proper reduction of speed and necessary caution at grade crossings."

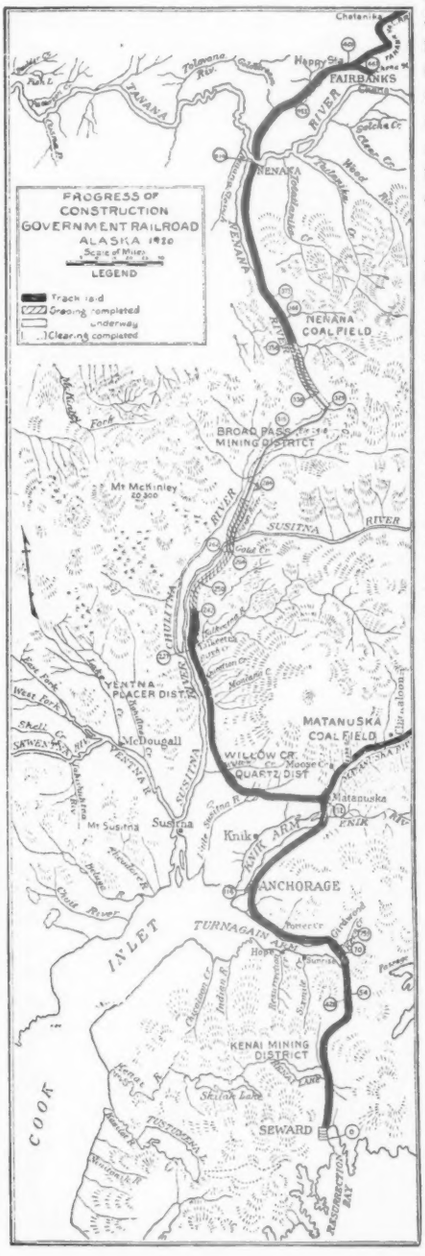
The proposed bill provides for a hump in the roadway, on each side of the railroad track; to be made sufficiently high and abrupt to compel a reduction of speed by reckless drivers. It stipulates that within 90 days from its passage the State Highway Commission and other state and county officers, constructing new roads or maintaining existing roads, shall construct at each crossing, within 100 ft. and not less than 50 ft. of the center of the railroad, and on each side, a hump, extending entirely across the highway. The hump is to be 7 ft. 6 in. wide at its base and sloping 10 deg. on each side, meeting in a rounded apex. The toe of the hump must be not less than 6 in. thick and its total thickness must be not less than 1 ft. 4 in. at the center. The proposed law would not apply to crossings in cities or towns.

The bill requires also the erection of signs, from 100 ft. to 150 ft. from the hump, bearing the words "SLOW—HUMP." The failure of the state officers to comply with the law shall be deemed a misdemeanor and subject to $25 fine, or imprisonment from five to ten days. The railroads would be required to pay one-half the expense of the humps.

Progress on Alaska Railroad

THE ANNUAL REPORT of the Secretary of the Interior includes the following regarding the progress on the Alaska government railroad:

Not a great deal was accomplished in actual new construction of the government railroad in Alaska during the first few months of the fiscal year 1920 because of the lack of appropriation and the uncertainty surrounding it. The original authorization of $35,000,000 was almost exhausted and data was being assembled for presentation to Congress asking for an additional authorization of $17,000,000. This was presented in July, 1919, and after extended hearings Congress granted the additional authorization in an act which was approved by the President on October 18, 1919. Of course, during these months the road was operated and maintained as well as possible under the circumstances, and some construction work done.



A plan of work was adopted in the early autumn which in its essential part embodied the following features:

Operation of a steamer to transport labor to and from Alaska, the labor forces in the territory being entirely inadequate for the prosecution of the work.

Purchase of supplies in the states sufficiently in advance for shipment to Alaska and their distribution along line over snow and ice during winter months.

Establishment of a supply division to attend to the securing and shipment of labor, handling of shipping of materials

and supplies, and to have general supervision over placing of orders for supplies, etc.

Consolidation of Seward and Anchorage divisions into one.

Completion of 1919 construction program on snowsheds, tunnel enlargement, and new bridge work between miles 40 and 60.

Continuance of work on reconstruction and rehabilitation, also ballasting, etc., of old Alaska Northern line.

Grading from mile 236 to 261, some parts of which had been finished but later damaged by action of river, rain, and snow.

Working of a few pile driver and bridge gangs all winter between Talkeetna and mile 261.

Attacking during winter of grading work from crossing of Susitna river to and including Rocky Canyon of Indian river, providing wagon road for freighting supplies ahead through Chulitna Pass to Hurricane Gulch.

Clearing of right of way for remainder of distance between miles 261 and 360, gangs working from both ends.

Construction of wagon road from Indian river through Broad Pass to connect with similar road on northern division.

Pushing forward of supplies, contractors' equipment, etc., for use in grading as far as Hurricane Gulch during summer of 1920 to permit construction of big steel-arch span over this gulch in winter of 1920 and 1921.

Completion of line north of Tanana river to Gold Stream and operation as narrow-gage line in connection with Tanana Valley Railroad as one unit.

Extension of track southward from Nenana to mile 358 (foot of Nenana Canyon).

Transfer of supplies to new camp at mile 358 for attacking heavy work in Nenana Canyon.

Congress having appropriated $6,000,000 on November 4, 1919, the plans as outlined were set in motion. The rehabilitation work on the Alaska Northern portion of the line reached the stage permitting the use of heavy locomotives and cars for the entire distance. To accomplish this, however, necessitated the construction of a switchback in mile 48 to eliminate the use of the high trestle, which was unsafe and will be replaced with a structure for permanent use.

In new construction on the southern division track was extended to mile 242½ by the end of June, 1920. Good progress was also made in new grading work northward to Hurricane Gulch, mile 284, and in making ready for track the grade constructed some months before.

Contracts have been let for practically all clearing of right of way remaining to be done. Clearing has been completed northward to mile 267½, and with the exception of about 8 miles, northward to mile 284.

On January 30, 1920, a contract was closed with the United States Steel Products Company for furnishing and erecting the first large steel bridge on the line as one progresses inland from Seward. This is the bridge over the Susitna river at mile 264, known as the Gold Creek crossing. The fabrication of this bridge was commenced soon thereafter, and it is contemplated that it will be erected during the fall of 1920 and winter of 1920-21.

The wharf facilities at Anchorage, including dredging, were completed to such extent that the largest vessels in the Alaska trade may tie up at the dock at all stages of the tide.

On the northern division (old Fairbanks division) the main line has been completed between the north bank of the Tanana River and Fairbanks, and track has been extended southward to mile 358, the foot of Nenana Canyon. Contracts for grading and tunnel work in the Nenana Canyon have been let and good progress made, considering adverse circumstances mentioned further on. Clearing has been completed on the division to mile 333.

The rehabilitation work on the Tanana Valley lines has been continued.

The branch line to Chena, no longer serving any useful purpose, inasmuch as the main line from Nenana to Fairbanks is completed, was taken up and the rail used elsewhere.

The operation and construction activities in this division were greatly retarded by the severe epidemic of Spanish influenza, which belatedly prevailed during the spring of 1920. Many deaths resulted therefrom and the physical weakness and demoralization accompanying the epidemic were greatly felt.

As stated above, when the program was formulated it was recognized that the labor situation would continue acute. However, after thorough investigation it was found inadvisable for the commission to operate a steamer of its own for the transportation of labor. Instead, an agreement was entered into with the two steamship lines operating to Seward and Anchorage for reduced rates for men and material. Under the arrangement, 715 unskilled laborers were shipped between January 1 and June 30, and details completed for the shipment of approximately 500 more laborers during the first few weeks of the fiscal year 1921. A great many more men could have been used, but could not be obtained.

The supply division was established as planned, with an office at Seward, and just before the close of the fiscal year moved to Anchorage to enable a close touch to be kept with the headquarters office.

During the past year the Alaskan Engineering Commission has employed from 75 to 85 men at Eska and from 30 to 35 at Chickaloon to furnish fuel for the government railroad and to prospect that portion of the Matanuska coal field immediately tributary to Chickaloon.

At Eska there are six coal beds under exploration, the average thickness approximating 3 feet. Upon these beds over 9 miles of underground workings have been driven since the commission acquired the property in 1917, providing over 3,300 tons monthly for the commission's current uses and blocking out over 100,000 tons for the future. This mine is not gaseous, and roof and floor conditions are good so that but few injuries have resulted from accidents underground. During the past two years Theodore Chapin, of the United States Geological Survey, has made extensive study of the geological conditions both at this mine and at Chickaloon, the results being published by the United States Geological Survey in Bulletin 712-E.

On June 17, 1920, a co-operative agreement was entered into between the Navy Department and the Department of the Interior, whereby the Chickaloon mine, theretofore operated by this commission, was taken over July 1, 1920, for the purpose of mining coal for the Navy.

The road will be of great benefit to all interior development, particularly if needed feeder wagon roads are constructed.

Photo by Underwood & Underwood

A Daily Sight at the American Canteen for Russian Refugees at Stamboul

Annual Report of the Chief of the Bureau of Safety

Recommendations Made in Previous Years Are Repeated—Fewer Casualties in 1919 Than in 1918

THE SAFETY APPLIANCE ACT and the Hours of Service law have been in effect for such a long time that their enforcement has now become largely a routine matter. The questions discussed in the annual reports of the Bureau of Safety vary little from year to year, and the report for the fiscal year 1920 is no exception. While there are a few recommendations in the report that are new, the fact that operating conditions warrant the chief inspector in renewing year after year the same recommendations regarding the maintenance of air brakes, the use of the block system and the observance of the hours of service law, indicates that railroad officers might well give more attention to the correcting of the conditions which have furnished cause for complaint for several years. A brief summary of the report of the chief inspector is given below.

Safety Appliances

The following statement affords opportunity for ready comparison of the results of inspections with previous years. It has been compiled from the figures for the fiscal years ended June 30, from 1915 to 1920.

	1916	1917	1918	1919	1920
Freight cars inspected....	908,566	1,100,104	1,059,913	1,023,942	864,775
Per cent defective.....	3.72	3.64	3.92	3.7	4.59
Passenger cars inspected.	27,220	29,456	25,732	23,712	19,849
Per cent defective.....	1.82	0.85	0.56	0.39	0.77
Locomotives inspected....	31,721	37,199	33,806	30,707	23,883
Per cent defective.....	3.66	2.69	2.18	1.84	2.38
Number of defects per 1,000 inspected.....	45.56	41.16	44.01	40.92	52.08

As shown by this summary, the number of cars inspected was less than for the preceding years, but the percentage for each class of equipment, as well as the number of defects found per thousand inspected, have materially increased. The decrease in the number inspected was occasioned by the numerous special investigations which the inspectors were called upon to make during the year, thus rendering it impossible to devote as much time as heretofore to regular inspection work. The proportionate increase in defects reported is attributed largely to the abnormal operating conditions which existed during the year, resulting in the use of equipment regardless of its age or condition and its continuance in service without necessary repairs, these conditions being aggravated by inadequate shop facilities and repair forces.

Of the total of 47,319 defects of all classes, 3,791 were to couplers and parts, 5,035 to uncoupling mechanism, 22,375 to air brakes, 4,049 to handholds, 1,940 to height of drawbars, 557 to sill steps, 1,444 to ladders, 2,399 to running boards, 5,507 to hand brakes, 36 to safety railings, 130 to footboards, 12 to pilot beam sill steps, 36 to handrails, 3 to steps for headlights, and 5 to power brakes on locomotives.

It will be noted that air-brake defects continue to represent by far the most numerous class. Nearly 50 per cent of all defects reported were to visible parts of air brakes, more than 20,000 of these defects being found in but five parts. The number of cars with brakes cut out of service continues unduly large. Of the 22,375 air-brake defects reported, 7,344, or nearly 33 per cent of the whole number, were cut-out brakes. At numerous terminals it is a common occurrence for cars with cut-out brakes to be made up in trains and permitted to depart in that condition, although facilities exist at such terminals for making necessary repairs to place all power-brake equipment in operative condition. This practice should be discontinued.

The condition of the air brakes in trains prior to departure, as ascertained by the commission's inspectors by means of terminal or standing tests is tabulated in the report. This table shows the results of tests of 938 trains, composed of 30,578 cars. The brakes on 94.7 per cent of these cars were in operative condition when the trains tested departed from the terminals. Of the total number of cars, there were 5 nonair cars, 178 cars with the brakes cut out, and 1,431 cars on which the brakes did not apply, making a total of 1,614 cars on which the brakes were not operative when leaving terminals.

Another table represents the condition of the air brakes, as ascertained by the commission's inspectors by means of terminal or standing tests, upon arrival of trains at terminals. This table shows that in 149 trains, consisting of 5,819 cars, the brakes were operative on 88 per cent of the cars. Of the total number of cars in these trains there were 194 with the brakes cut out and 477 on which the brakes did not apply, or 671 cars with inoperative brakes. This table shows that of 41 roads on which arriving tests were made there were 14 on which trains did not have an average of 85 per cent operative brakes. It is apparent that the law is not being complied with as to the minimum percentage prescribed by the order of the commission of June 6, 1910, nor as to the requirement that all air-brake cars associated with the minimum percentage must also be used and operated. The arriving tests show the condition of air-brake equipment from a practical operating standpoint. Carriers should take necessary measures to insure strict compliance with the law and see to it that trains at all times are operated not only with the minimum percentage of operative brakes specified by law, but also with all associated air brakes used and operated.

On March 2, 1920, application was filed by the American Railroad Association for a further extension of time within which to equip cars in service on July 1, 1911, to conform to the standards of equipment prescribed by the commission's order of March 13, 1911. This application for an extension of time was denied by the Interstate Commerce Commission on August 7, 1920.

The report calls attention to violations of the Safety Appliance Act occurring at interchange points. One carrier delivers cars to another with defective safety appliances and the receiving carrier moves the cars to its yard, thus making two violations of the law. Adequate inspection and proper repairs prior to assembling cars for interchange movement are recommended to eliminate this difficulty. The practice of permitting defective cars to accumulate and making them up in a train for movement to a repair point is also condemned. Recently two suits were instituted against carriers for movement of trains of this nature.

The handling of logging trains is again referred to and the chief inspector states, in view of the conditions existing, the law should be amended by placing further restrictions upon the operation of such trains.

Hours of Service

Mention is again made of the handling of trains down heavy grades by means of hand brakes supplemented by air brakes. Suits are being instituted for the purpose of compelling strict observance of the law. The statement is made that controlling trains by air brakes alone is the safer and better practice and is dependent merely on proper mainten-

ance of air brake equipment. Defective hand brakes are also mentioned as the source of many suits.

During the year ended June 30, 1920, hours of service reports were rendered by 1,192 railroads. Of these railroads, 447 reported a total of 106,501 instances of all classes of excess service, a decrease of 43,892 instances as compared with the previous year, or a reduction of about 29.1 per cent; the remaining 745 railroads filed reports showing that no service in excess of the limitations prescribed by law was performed by their employees.

The causes of instances in which train service employees remained on duty longer than 16 consecutive hours on roads reporting excess service, as shown by the Statistical Analysis of Carriers' Monthly Hours of Service Reports for the past five years, have been arranged in the following table for the purpose of comparison:

Causes	1916	1917	1918	1919	1920
Collisions	3,414	3,421	5,744	2,531	1,634
Derailments	25,013	30,395	40,849	24,556	22,604
Track defects and obstructions	4,696	3,982	4,514	1,774	1,786
Landslides, high water, fire	2,983	3,064	2,852	1,243	2,395
Adverse weather conditions	9,532	10,616	43,759	2,769	12,115
Congestion of traffic	1,769	16,250	20,026	4,631	2,829
Station work, waiting for orders, and meeting trains	2,822	5,057	14,621	3,862	2,456
Coupler and drawbar defects	5,113	6,292	15,894	12,881	6,978
Miscellaneous car defects	9,386	10,246	19,589	9,247	4,814
Hot boxes	232	491	1,848	388	220
Air brake troubles	1,054	854	2,433	2,136	1,906
Taking or running for water	466	1,016	2,653	433	587
Cleaning fires	45	181	679	136	69
Low steam:					
Poor coal	30	671	1,510	118	206
Bad water	46	28	87	....	....
Leaking	607	656	2,014	753	301
Miscellaneous locomotive mechanical defects	3,616	4,738	11,552	5,107	3,215
Wire troubles	168	206	497	108	92
Sickness, death, personal injury	131	173	339	319	93
Miscellaneous	1,932	2,905	7,829	5,177	3,168
Total[1]	73,055	101,242	199,289	78,169	67,468

[1]Railroads reporting fewer than 25 instances in the aggregate of all classes of excess service were not enumerated during the years 1916, 1917, 1918 and 1919. Figures for 1920 include all instances reported.

The foregoing table shows a decrease of 10,701 instances, or a reduction of about 13.7 per cent, in which employees remained on duty longer than 16 consecutive hours as compared with the number reported for the preceding year.

Approximately 51 per cent of the total instances of train service employees remaining on duty longer than 16 consecutive hours during the fiscal year is chargeable to derailments, coupler and drawbar defects, and miscellaneous car defects, there being 34,396 instances due to these causes. These figures, however, show a decrease of 12,288 instances, or a reduction of about 26.3 per cent, as compared with the number of instances resulting from the same causes during the preceding year. The only causes resulting in appreciable increases in the instances of employees remaining on duty longer than 16 consecutive hours were landslides, high water, fire, and adverse weather conditions, there being 14,510 instances resulting from these causes during the year as compared with 4,012 instances due to the same causes in 1919.

To aid in effecting enforcement of the hours of service law, as has also been stated in previous reports, it is necessary that the commission be informed of each and every instance, as was contemplated in its order of June 28, 1911, requiring such reports, in which employees are on duty beyond the limitations prescribed by the act, together with an explanation of the conditions and circumstances causing each such excess service. Therefore, in order to exact of the carriers full and complete reports, the law should be so amended as to provide a penalty for each omission by a carrier from its monthly report of instances of excess service performed by its employees.

Summary of Casualties

The casualties on steam railroads in connection with the operation of trains during the calendar year 1919 are summarized as follows:

Class of persons	Number of persons	
	Killed	Injured
Trespassers	2,553	2,658
Employees	1,759	7,456
Passengers	273	36,601
Persons carried under contract, such as mail clerks, Pullman conductors, etc.	28	5,195
Other nontrespassers	1,882	52,601
Total of above classes	6,495	691

In addition there were 483 persons killed and 96,452 injured in nontrain accidents during the year, in comparison with 589 killed and 110,431 injured during the previous year.

During the calendar year 1919 there were 108 employees killed and 1,975 injured in coupling or uncoupling locomotives or cars, as compared with 164 killed and 2,332 injured during 1918. Casualties to employees in 1919, due to coming in contact with fixed structures, resulted in 56 deaths and 1,009 injuries, the corresponding figures for 1918 being 83 and 1,367. In 1919 there were 97 employees killed and 6,219 injured in getting on or off cars or locomotives.

[The Bureau's summary of train accident investigations was reported in the *Railway Age* of December 17, page 1077.]

Investigation of Safety Devices

During the year plans of 54 devices were presented for consideration and revised plans and specifications were submitted in connection with 14 devices; the plans of 65 devices were examined and opinions thereon transmitted to the proprietors or their agents. Of the number examined, five possessed merit as safety devices, warranting some degree of commendation. Of the latter, one was a flashing-light signal, one an automatic connector, one a steam and water cock, and two were hand brakes.

During the year tests were made on the Richmond, Fredericksburg & Potomac of a portion of the automatic train-control apparatus of the Pittsburgh Train Control Co., Pittsburgh, Pa. This automatic train-control system is the continuous-control, induction type, employing alternating-current track circuits, induction coils suspended from the locomotive above the track rails, and an electron tube in the locomotive circuits which serves, in effect, as a relay. The purpose of these tests was to determine whether the intended functions of this device could be accomplished under railroad operating conditions and to supply data regarding the feasibility of using an electron tube on a locomotive for purposes of an automatic train-control system. The results of the tests demonstrated that it was possible to accomplish the intended functions of this apparatus under service operating conditions, but indicated that considerable development work in connection with the apparatus is required before this system can be considered a practical method of automatic train control.

Tests have also been conducted of the device of the United States Train Signal Co., of Portland, Me. This device is an electropneumatic signal system providing means of transmitting signals between the cars and the locomotive in a train, and vice versa. It consists of electropneumatic valves controlled by a series circuit, one valve being installed in each car or locomotive cab, and provided with indicators, both audible and visual, which are operated when the circuit is interrupted; circuit controllers for operating the device are provided in each car and locomotive. The examination and tests of this device demonstrated that visual and audible signals, which are displayed and sounded simultaneously on each equipped vehicle, can be transmitted as rapidly as the circuit controller can be operated; and signals can be acknowledged by engine crew or transmitted from engine crew to train crew without the use of the locomotive whistle.

An inspection has been made and demonstrations witnessed of the automatic connector of the Robinson Connector Co., New York, N. Y., as installed on passenger

equipment of the New York Central operating between Dunkirk, N. Y., and Titusville, Pa. This connector is of the butt face, straight port type, with wing type guiding members, which form the gathering and registering devices. As a result of the inspections and demonstrations of this device, the Robinson connector is considered well adapted to accomplish its intended functions when used on passenger-train equipment. The few irregularities of operation noted during these demonstrations were without exception due to details of construction and installation which can readily be improved. The use of gaskets of special design is undesirable from an operating standpoint. It is believed the gathering range and registering means employed by this device are adequate and reliable and that with this connector tight joints can be maintained.

Preliminary steps have been taken and plans are being formulated for the administration of section 26 of the Transportation act, conferring upon the commission authority to require the use of automatic train stop or train control devices and other safety devices in designated locations and to prescribe specifications and requirements therefor.

Block Signal Statistics

The commission's annual statistical bulletin for January 1, 1920, covering block-signal and train-order mileage, was compiled by this bureau. As shown by this bulletin, the total length of railroad in the United States operated by the block-signal system on January 1, 1920, was 101,884.2 miles, of which 37,968.8 miles were equipped with automatic block signals, and on 63,915.4 miles the nonautomatic block-signal system was in use. Comparing these figures with the corresponding record for the preceding year, there was an increase of 979.4 miles equipped with automatic block signals, and an increase of 1,007.1 miles in nonautomatic block-signal mileage, the total increase in block-signal mileage being 1,986.5 miles.

The report includes the usual tabulation showing the results of the inspection of safety appliances and tests of air brakes on trains arriving at and departing from terminals. Numerous judicial interpretations of the safety appliance law and the hours of service law are summarized in the report.

Chicago & Eastern Illinois Reorganization Plan

THE CHICAGO & EASTERN ILLINOIS RAILWAY, a new Illinois corporation, has filed an application with the Interstate Commerce Commission for authority to issue its securities to take over the property of the Chicago & Eastern Illinois Railroad, now in the hands of receivers, and to meet the obligations of the old company. It is proposed to assume the underlying bonds and equipment obligations of the old company to the amount of $5,350,000, which are not to be disturbed, and to issue prior lien bonds of the new company to the amount of $4,285,000, to mature not before January, 1961, the proceeds to be used to refund obligations to the United States and other obligations, and for making additions and betterments. The new company also asks authority to issue $32,156,000 of general mortgage bonds at 5 per cent, maturing January, 1951, $24,030,150 of 6 per cent preferred stock and $25,500,000 of common stock. This will make the total capitalization of the new company $91,321,150, as against $115,605,043 for the old company, and its fixed charges will be $2,169,628, or $2,118,952 less than those of the old company.

The application states that as soon as and if the commission will make an order authorizing the issue of new securities, the foreclosure sale set for January 11, 1921, can be held and the plan which has been agreed to by the various stockholders' committees can be declared operative. The method by which the division of the securities of the reorganization company should be made has been agreed upon by the committees. The new company will pay the receivers' certificates now outstanding and certain other charges in cash and will make an offer to the remaining holders of the securities of the old company by which they will exchange their bonds and stocks for the bonds and stock of the new company. The new company proposes to raise money by loans from the government and an assessment on its stockholders and creditors. Holders of the preferred and common stock of the old company may receive an equal amount of common stock of the new company in exchange, on the payment of an assessment of $30 per share, for which they will receive one-half in general mortgage bonds and one-half in preferred stock. The opportunity of a similar assessment may be offered to the creditors and bondholders.

The proceeds of the assessment (approximately $6,000,000), plus the proceeds of the proposed settlement with the director general (approximately $6,500,000) and the advance from the revolving fund by the commission ($785,000), together with current earnings, will make possible the completion of the reorganization. The application states that in the seven years the company has been in receivership it has been practically entirely rebuilt and modernized as a first-class railroad with increased earning capacity. The reorganized company should have first-class credit in every way, better than that of the old company and certainly far better than that of the receiver. It will have no debts other than current operating expenses, except its long-term bonds and its equipment obligations and its obligations to the government, which will not mature for 10 and 15 years. During the receivership the rebuilding was financed by devoting practically all earnings of the property to the program of rebuilding and by $3,437,758 provided by the director general of railroads for additions and betterments and $741,000 for equipment. Several items of property then owned by the company have been separated, including coal properties acquired in 1912, by the issue of $5,167,000 of bonds, the Evansville & Indianapolis Railroad and the Chicago & Indiana Coal Railway. A substantial part of the floating debt remains unpaid, consisting principally of debt for money loaned and also an issue of $6,000,000 of receivers' certificates. All bonds which were liens on the property outstanding at the date of the receivership have been financed except a few underlying bonds. The carrying out of the proposed settlement by the director general by which the company is to receive $3,000,000 in cash and a loan of $3,500,000 and the loan to be made by the government, are declared to be a prerequisite to the reorganization.

The company will have greatly simplified its capitalization. Its general mortgage bonds and preferred stock will take the place of many of the various bond issues now outstanding. Interest on the general mortgage bonds should be earned and the preferred stock should be able to earn dividends almost at once, while the common stock will have a prospect of earnings and at some later period may share in the distribution of earnings. The company will begin business with current operating expenses, which will be covered by its current receipts, and have an adequate cash working capital. The present operating management is to be continued without substantial change. The Illinois Public Utilities Commission also filed a statement saying that it had no objection to the plan of reorganization nor to the proposed issue of securities.

T. D. Heed, financial assistant to the receiver for the Chicago & Eastern Illinois, has issued a statement saying:

"We have put the proposed issuance of securities of a new company up to the Interstate Commerce Commission. This is the first case involving a reorganization to go before the

Commission under the new Transportation Act, and presumably that body will wish to proceed slowly, with the feeling that any action it takes in this case may become more or less a precedent for other reorganizations.

"Committees working toward a reorganization of this property are not averse to the Commission taking its time, as the market for securities just now is at its worst. A little later we might find a reorganization easier to accomplish.

"We have not agreed upon any assessment yet, nor have we settled our accounts with the government for the use of our property during federal control. We have had offers from the director-general, but have not accepted any."

Chairman Clark Discusses Freight Rates

WASHINGTON, D. C.

CHAIRMAN CLARK of the Interstate Commerce Commission has written a letter to Senator Harris of Georgia in reply to a letter from the senator expressing a hope that an adjustment can be made which will bring down freight and passenger rates and asking for information from the commission on the subject, in which the chairman expresses the opinion that "it is by no means certain that even with the existing level of rates the carriers can, under the existing level of operating expenses, the principal items of which are wages and fuel, earn a reasonable income.

The senator said in his letter that it had been brought to his attention that the present high passenger and freight rates are doing more to decrease the amount of income received by the railroads than if lower rates were in effect. He said that both the public and the railroads deserve an honest living, but feared that both are now suffering. Chairman Clark replied that the desire expressed by the senator to see freight rates and passenger fares placed within the reach of the average person and at the same time give the railroads a reasonable income, "is one in which we all cordially join." "Times are abnormal," he said, "and conditions generally affected by the aftermath of the war. It is trite to say that the country must get back to a more normal condition and more normal bases for commerce, industry and transportation. It is not to be expected that we will get back to pre-war prices for labor, commodities or for transportation, but it is to be expected and really is necessary to get back to a situation in which prices of labor, commodities and transportation will bear proper relative proportions." The period within which the readjustment of rates contemplated by the transportation act and recognized as necessary by everybody must be made was short, said Chairman Clark, and the matter had to be dealt with in a broad and somewhat general way. The propriety of that line of action was recognized by those interested on both sides, as was also the necessity for a readjustment. Naturally in those readjustments, the interests of the carriers and of their patrons are in conflict and their views diverge.

"The financial results from the operation of the railroads by the government are well known, as is also the fact that the level of operating expenses had risen out of all proportion to the revenue from the then existing rates," Mr. Clark continued. "The operating ratios were and still are abnormally high. We are endeavoring to keep abreast of the situation. We are exercising our powers insofar as seems appropriate, to prevent unreasonable or inappropriate increases in charges by the carriers, and co-operating with the carriers and the shippers in bringing about appropriate readjustments through reductions in charges, especially where it appears that the existing charges are such as to prevent the movement of traffic. I think you are entirely correct when you say 'both the public and the roads deserve an honest living, but I fear both are now suffering.'"

Chairman Clark said that a substantial reduction in the amount of freight received for transportation has resulted in large part from the closing down of a great many industries and to the shortening of time of operation in many manufacturing and industrial enterprises in every part of the country.

Rail Statistics Show Improvement for 1914 Rolling

THE ANNUAL REPORT on rail failures just made public by the American Railway Engineering Association shows that further progress has been made in the reduction of rail failures. According to this report, which was prepared by M. H. Wickhorst, engineer of tests for the rail committee and which appears in the association's Bulletin No. 229, failures in rails rolled in 1914 averaged 74 failures per 100 miles of track in the five years of service on which data are now available. This represents a distinct improvement over the returns on rails rolled in 1913, which showed 91.9 failures per 100 miles for five years' service, and is a much better showing than the 398.1 failures for the 1908 rails, the first rollings for which complete statistics were made by the Rail committee.

TABLE I—AVERAGE FAILURES PER 100 TRACK MILES

Year rolled	Years service 0	1	2	3	4	5
1908	....	....	....	....	....	398.1
1909	....	....	....	....	224.1	277.8
1910	....	....	....	124.0	152.7	198.5
1911	....	....	77.0	104.4	133.3	176.3
1912	....	28.9	32.1	49.3	78.9	107.1
1913	2.0	12.5	25.8	44.8	69.5	91.9
1914	1.2	8.2	19.8	32.9	50.9	74.0
1915	0.7	8.9	19.0	34.2	53.0	....
1916	1.6	11.8	29.2	47.7	....	....
1917	5.3	21.6	38.9	....	....	....
1918	1.6	8.9	....	....	....	....
1919	2.0	....	....	....	....	....

Mr. Wickhorst calls attention to the rather disturbing fact that less favorable results are being obtained for rails rolled subsequent to 1914. This is clearly shown in Table I summarizing the rail failure statistics to date in which it is seen that the failures for one, two, three and four years' service on rails rolled in 1918, 1917, 1916 and 1915, respectively, are heavier than for corresponding periods of service in earlier rollings. Mr. Wickhorst's comment on this is that "during the war and for a while thereafter there were difficulties in the way of maintaining a high standard of quality in the manufacture of rails, but a study of the detail results suggests that in some cases, there may have been a loss of control of the mill situation."

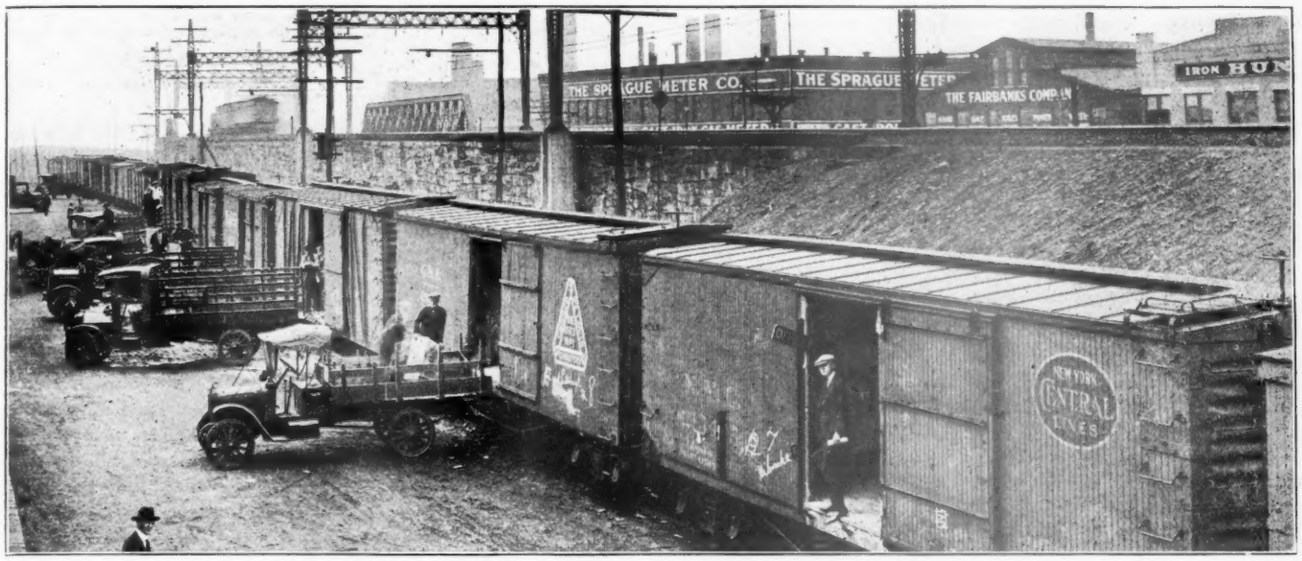
As to future performance the feeling is more favorable since the report states that: "A drop in the failures from almost 400 per 100 track miles for five years' service in the 1908 rails, to 74 in the 1914 rails, is a decrease of over 80 per cent. A close study of the detail reports indicates that a further decrease of over 80 per cent of the failures of the 1914 rails is possible. We should now set up as a new objective the reduction of the failures to below 10 per 100 track miles for five years' service, or below two failures per 100 track miles per year.

"The tonnages and track miles of rail represented by the statistics in this report are given below:

TABLE II

Year rolled	Tons	Track miles
1914	1,149,410	7,917.26
1915	1,077,558	7,280.51
1916	1,245,185	8,407.55
1917	1,136,944	7,615.46
1918	947,073	6,354.44
1919	620,250	4,272.95
Totals	6,176,420	41,848.17

"As there have been comparatively few Bessemer rails listed in recent years, they are no longer listed separately."



Loading L. C. L. Freight at Bridgeport

Less-Car-Load Shippers Co-operate in Car Loading

Local Agent's Discretion in Choosing Route, with Sailing-Day Plan, Saves Cars and Time

At Bridgeport, Conn., last spring and summer, the delays incident to the extreme freight congestion which prevailed throughout the Eastern States at that time were materially moderated by having shippers load package freight directly into cars placed on team tracks. By means of a systematic scheme which was adopted for advising the principal shippers, a day in advance, of the precise location of cars to be loaded for different important destinations, a large volume of freight was moved in this way, when, because of shortage of labor and the resulting congestion, the movement of the goods through the freight house in the ordinary way would have been out of the question. This arrangement proved so satisfactory that it is still kept up, to the mutual satisfaction of shippers and carrier.

Important features of the arrangement are a sailing-day plan, to economize cars, and an informal agreement between the railroad and the shippers under which the freight agent is allowed some discretion in holding shipments over a day or two, whenever the limitations imposed by the size of the yard, or a deficiency in the car supply, have made such delay necessary.

From a memorandum by H. M. Hedderly, local agent, we have gathered the following notes of this interesting experiment:

Bridgeport, served by one railroad, the New York, New Haven & Hartford, has been since 1915 one of the busiest manufacturing cities of the country, and its products go to all parts of the West and South. At the period of greatest stagnation, due to the outlaw strikes, there were hundreds of cars standing idle in Bridgeport, while at the same time the factories were continuing to turn out their products in full volume. Ninety per cent of the products of the Bridgeport factories was destined for points outside of New England; and the important gateways through which this merchandise was to move were also in trouble; Bridgeport was not the only center of difficulty. After a number of weeks of this situation some of the firms were on the verge of financial failure, and something had to be done. The first move was to permit the loading of carload freight. These shipments were taken "subject to delay" and also subject to the privilege, on the part of the railroad, to forward the goods over the first open route available.

Following a conference with the Board of Trade and other organizations it was decided to extend this direct-loading privilege to smaller manufacturers by accepting l. c. l. freight in the same way, provided the shippers would to some extent pool their shipments so as to deliver goods for given destinations on given days, the privilege of routing still being left to the railroad.

As a beginning in this experiment, each shipper sent to the railroad a memorandum showing the destination and the approximate tonnage of proposed shipments. This put in the hands of the railroad a large amount of data, the arrangement of which, in order to determine the most practicable routes, required several days. Having made a program, the agent placed a limited number of cars and prepared a list of them, with destinations. This arrangement was carried out without trouble; and this freight, together with the carload shipments, amounted to about 400 cars before there was any chance to move any of them beyond the Hudson River. The shippers were, however, in part satisfied, as they could invoice their goods and thereby secure some measure of relief, enabling them to continue the operation of their factories.

By the middle of July the principal gateways—Buffalo, Pittsburgh, Cleveland, Chicago and St. Louis—had been materially relieved and normal operation was resumed.

The benefits of the sailing-day plan and of loading direct into cars were, however, so marked that the practice of placing cars to be loaded for certain prominent points was kept up; and has been developed so that now arrangements for loading like that, for example, prescribed for Thursday, September 2 (shown in the sample statement below) have become a regular thing.

There is some pressure to go back to the old plan, of moving outbound freight through the freight house. One

of the principal objections, however,—that the shipper has no room on his own premises to store shipments, waiting for the date set by the railroad, beyond one day,—has been pretty well exploded, so far as Bridgeport is concerned, by the experiences of the past summer, when large numbers of shipments had to be held by some of the manufacturers for several weeks.

The New Haven road connects with all lines to the West and to the South, and, of course, in exercising discretion in selecting the routes, has to take care to be always neutral. For example, cars for Buffalo will be given to the Lehigh Valley one time, and then the next time to the Delaware, Lackawanna & Western; then, next, perhaps, the cars will be sent over the Boston & Albany and the New York Central; and later to the Erie or the Pennsylvania. Cars destined to points beyond the Mississippi River are alternated over several lines. To some of the remote points a car can be loaded full only about once a week, and the endeavor is made in such cases to set the car on the same day of each week.

Explaining the details of his plan, Mr. Hedderly says:

We load an average of 15 cars a day under this plan, employing six receiving clerks, one route clerk and six stevedores. In July our cost averaged 38 cents a ton, and in August, 51 cents, under the recent wage award. We handle an average of 150 tons a day, with a maximum of 225 tons. The average loading per car in July was 20,860 lb. and in August 23,700 lb.

The lists for shippers are prepared three days in advance and are called for by patrons daily in person, or by messenger, or by their truckmen. In giving out these lists in advance we have at times violated embargoes, but we have never had a car held up. It is necessary to make the lists 36 hours ahead of time in order to give customers an opportunity to assemble their freight for certain cars. During the beginning of this plan there was an extreme shortage of labor in our freight houses and the discharging direct to cars by their own forces was a great relief to shippers.

In handling freight in this manner we have reduced claims for shortages and for damage, as well as practically eliminating requests for tracing. We are loading cars to their cubical carrying capacity; and if any car is not fully loaded it is held over and placed on the list again three days later, when it is filled. This expedient, however, is not frequently resorted to.

Below is a sample of the car lists sent to shippers, that for a recent average day:

CARS TO LOAD, THURSDAY, SEPTEMBER 2, AT UNION STREET YARD, TRACK 8

Chicago, Ill. Route, B&A NYC	Load Chicago only	Direct car
Philadelphia, Pa. Route, PRR	Philadelphia only (Walnut Street)	Direct car
Pinners Pt., Va. Route, PRR NYP&N ACL	All points in North and South Carolina and Georgia, except Atlanta, on Atlantic Coast Line R. R., and all points in Florida.	
Spencer Transfer, N. C. Route, PRR Sou. Ry.	All points in North and South Carolina and Georgia, except Atlanta on Southern Ry.; and all points in Tennessee.	
Collinwood Tfr., Ohio Route, B&A NYC	All points on New York Central Lines in Ohio, except Cleveland and Cincinnati; Indiana except Indianapolis; and Illinois except Chicago.	
Elizabethport Tfr., N. J. Route, CRR of NJ	Points in Pennsylvania and New Jersey except Jersey City and Newark on CRR of NJ; points on P&R in New Jersey except Trenton.	
Pittsburgh Tfr., Pa. Route, PRR	All points on Pennsylvania R. R. west of Pittsburgh except Cleveland, Chicago and St. Louis.	
Chicago Tfr., Ill. Route, NYC CMSt.P	Points in Wisconsin except Milwaukee.	
Chicago Tfr., Ill. Route, LV NYC CB&Q	Points in Oklahoma, Kansas and Missouri except St. Louis.	
Black Rock, N. Y. Route, DL&W MC	All points in Michigan except Detroit and points on Pere Marquette R. R. and Grand Trunk R. R.	

Shippers should furnish routing as shown. This schedule is conditioned on empty cars being available, and inquiry should be made before starting shipments from factory.

Under the old plan of accepting freight indiscriminately for various points we could only hope to load to transfer points, or for immediate connections, because the traffic was routed over so many different lines. This, of course, resulted in handling and rehandling the goods, while under this plan we get the full benefit of the most direct loading and full car loading; while yet the shipper has his choice of routes at stated intervals.

Our plan has been adopted to some extent by other lines. One large concern in New York state shipping newsprint paper formerly loaded shipments to a nearby transfer point to be distributed, but now is loading its Southern shipments over a direct route, breaking bulk at Charlotte, N. C., or Hamlet, N. C., with a much improved service. Cars usually reach the break-bulk point in less time than had been required to get through the nearby transfer.

The picture shows the loading track full of cars. One of the cars in the string, the first one, bears a sign "office." This does not mean that the car is used exclusively for that purpose, but is to indicate to teamsters that that is the place to look for the receiving clerk.

The Application of Engineering to Transportation*

By J. A. Peabody

Signal Engineer, Chicago & North Western, Chicago

EVERY ONE KNOWS that the transportation facilities of the railroads of the United States are far below the requirements and that enormous sums of money must be spent in order that the railroads may regain their position.

Numerous solutions of the difficulty are offered and these, I think, can all be divided into two classes; first, efficiency in the use of present facilities; second, increase of facilities.

It is relative to the second solution, viz. the expenditure of the vast sums that must be made, that the engineer should give his attention. His knowledge, ability and best thought must be brought to bear in assisting the executives in determining where the money is to be spent if tremendous waste is to be prevented.

It seems to me that we have come to a new period where the railway engineer has an opportunity to come into his own, but where railway engineers, if they are to make the best of their opportunities, must get into closer contact with the necessities of their business than ever before.

In the distant past when additional facilities were required, it was only a question of building an addition to a railroad. Later it became necessary to double track and, in a few instances, to install three or four tracks, together with yard and engine house facilities. It is but a few years since signaling and interlocking were introduced and it was some time afterwards before it was realized that both signals and interlocking could be used to facilitate traffic as well as protect it. There is no doubt but that properly installed block signaling and interlocking alone would make easy the operation of some lines that are now badly congested and pay heavy returns on the investment.

Traffic is handled by the operating men over tracks furnished by the civil engineers, by means of locomotives and cars furnished by mechanical engineers and with the assistance of telegraph, telephone and signals furnished by communicating and signal engineers. But can you find

*Abstracted from a paper presented before the Western Society of Engineers, Chicago, on September 16, 1920.

where any one, engineer or otherwise, has planned the whole so that the parts will fit properly together? When some big improvement is to be made, such as a large terminal, an organization is often created which may make a study of the existing necessities and future requirements, but such an organization is more apt to be made up of men selected for their ability to carry out the work from plans and instructions laid down in such a definite form as to leave little, if any, leeway, and when that particular piece of work is completed the organization is generally disbanded. Special men are sometimes employed either as consulting engineers or as assistants to the president or vice-president; but this is rare and few have had a permanent place in the organization.

Small improvements almost invariably are first suggested by an operating officer, usually divisional, who is confronted with an absolute need. If the railroad organization is of the division type, the superintendent and division engineer get together and plan relief. Under these conditions effect only and not cause is usually seen and the plans, of necessity, reflect the fact.

Division officers are busy men; they have little time or opportunity to find out what others are doing and certainly neither time nor opportunity to make complete studies to determine what the possible requirements will be 20 years or even 10 in advance. Division officers are generally required to get along with what they have and ask for as little as possible; this, together with the other reasons mentioned, results in recommendations for improvements which a close study with full information may show to be entirely erroneous.

An efficiency engineer has been defined as an engineer who is ready to tell any one how to do things which he cannot do himself. Far be it from me to recommend such an engineer to take care of this situation. I do believe, however, that there is a place on every large railroad for a man who, with proper assistance, makes a specialty of studying the transportation problem. Such a man, I believe, can properly be termed "transportation engineer." The decision as to just where a transportation engineer would best fit in the railroad organization will unquestionably vary on different railroads, depending somewhat on the size of the road, more on the amount and importance of the work undertaken and most on the man.

There would seem to be almost no limit to the possible scope of the work which might be brought under the term of transportation engineering, because, with the movement of both freight and passenger traffic to be studied, there must come studies of the growth of communities, mining, farming, urban, suburban and industrial, in order to determine the trend so that the necessities of the future may be foreseen and planned for. The studies relative to the handling of freight would not only be those relative to moving trains over the road, important as that is, but also that of handling freight trucks from the time they approached the railroad property to the time they are emptied into the cars or freight houses and the freight thence to the made-up trains and, of course, vice versa.

There is the importance of moving freight trains over the road. How often when this is under consideration is a definite analysis made to determine where the difficulty lies? Wellington mentions the necessity for the proper location of passing tracks, but it was not until within a very short time that F. L. Dodgson developed a method of analysis to determine on the proper location of passing tracks on a single track railroad by establishing as nearly as possible an equal distance, in time, between all passing tracks.

Of course, the theoretical location of a passing track is not the only thing to be taken into consideration. After the theoretical location is obtained a practical location must be selected taking into consideration the possibility of a train being able to enter and leave the passing track in either direction if possible, also to obviate curves, or, if not possible, to have the passing track on the outside of the main track at the curves. Another thing to look out for are highway crossings.

After all these things have been taken into consideration it goes without saying that the cheapest place, in first cost, to construct a passing track will seldom be selected. It is also almost as obvious that the cheapest place, as far as the cost of operation is concerned, will have been selected.

The cost of operating trains, not for the railroad as a whole, but for each engine division, should be gone into in order to determine, if possible, how each may be cheapened. The cost of switching in each yard should be known. The cost of handling engines at each terminal should be known, to disclose where it would be advisable to make studies relative to reducing that cost. Analysis should be made of each piece of congested main track and methods for increasing its capacity determined, together with, of course, the cost of doing the work; the relative cost of operation also should be taken into a consideration. In this connection not only comes the question of proper location of passing tracks, as heretofore mentioned, but also there should be taken into consideration signaling, interlocking, the dispatching system, reduction of grades and curvature and every other item that will go to make for economical operation.

Analysis of large terminals should be made to determine whether the handling of cars cannot be reduced materially. In a large terminal, such as Chicago, the consolidation of some yards would reduce the transfer work and therefore the several handlings of a car. It would also materially shorten the time required to deliver a car from the road to an industry or vice versa.

The methods generally used in the handling of l.c.l. and trap car freight in large terminals seem to me to be very crude and it would seem that a close study of this would produce methods that would result both in quicker and cheaper handling.

In all this we must not forget the passenger service, and in this connection it would seem that there are opportunities for materially increasing the revenue by decreasing the cost of operation, particularly in handling suburban traffic. Today I believe that the steam railroad engineer is very much behind the electric railway engineer in his knowledge of what can be done in this direction. In connection with the subject of electrification, there is certainly food for thought, as it does not seem that there could be much question but that many lines that are now decidedly congested on account of the gradients could have their capacities greatly increased by electrification and probably the cost of operation decreased as well.

Any engineering body or individual wishing to take up the question of transportation engineering will find the subject has a breadth requiring the investigation of every item of economical operation. My conclusion is that the transportation problems of today will only be solved by the application of engineering knowledge and that consequently the engineer has a better opportunity of knowing his worth today than ever before.

A CAB SIGNAL, both visual and audible, and which is actuated by the explosion of torpedoes on the track, has been applied to a locomotive of the London & Southwestern. The locomotive has tubes, about 2 in. in diameter, fitted in front of the leading wheels, arranged like an ordinary sand pipe. By agitating the air in the tube the explosion of a torpedo is made to expand a small pneumatic chamber, fixed on the engine frame, which expansion opens a normally closed electric circuit. The apparatus has been tried, with very satisfactory results.

Operating Statistics for October

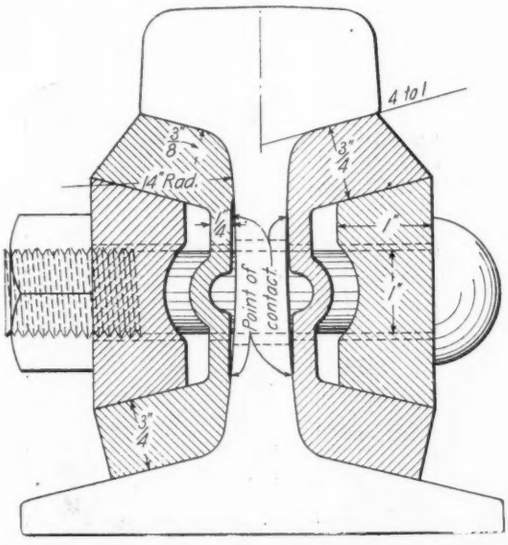
The Interstate Commerce Commission has issued a tabular summary of operating statistics for the month of October, 1920, of roads having annual operating revenues in excess of $25,000,000. The figures for ton miles, train miles, car loading and car mileage and net ton miles per car day (including mixed and special train service) are summarized in the following tabulation by the Commission:

Region		Freight-service train-miles (thousands)		Net ton-miles (millions)		Net ton-miles per loaded freight car-mile		Car-miles per car-day		Net ton-miles per car-day	
		1920	1919	1920	1919	1920	1919	1920	1919	1920	1919
New England Region:											
Boston & Albany	October	329	339	142	161	25.5	24.5	33.8	33.1	566	559
	10 months	3,085	2,654	1,361	1,184	24.9	22.2	27.2	32.0	473	502
Boston & Maine	October	729	768	379	380	25.5	24.4	19.9	18.8	338	320
	10 months	6,929	5,954	3,305	2,839	24.5	23.3	16.4	17.6	290	298
New York, New Haven & Hartford	October	618	619	341	364	25.1	24.3	12.8	15.3	233	279
	10 months	5,098	5,059	2,569	2,760	23.7	23.3	10.2	14.2	181	249
Great Lakes Region:											
Delaware & Hudson	October	443	449	405	387	35.9	35.8	31.4	32.4	726	744
	10 months	4,230	3,712	3,759	3,076	35.3	35.7	27.6	26.6	658	615
Delaware, Lackawanna & Western	October	620	496	533	455	28.7	28.8	38.2	30.8	719	653
	10 months	5,167	4,607	4,421	4,203	28.7	29.6	28.7	27.7	582	579
Erie (including Chicago & Erie)	October	1,251	1,090	1,149	1,052	28.7	28.3	35.6	37.5	670	712
	10 months	10,735	9,597	9,896	8,827	29.2	28.5	25.4	31.4	520	600
Lehigh Valley	October	697	594	661	595	32.8	31.4	29.1	24.2	633	557
	10 months	6,034	5,372	5,402	4,902	31.6	30.5	21.0	22.8	467	490
Michigan Central	October	574	598	433	473	23.9	21.5	31.1	24.8	510	400
	10 months	5,268	5,164	4,195	3,782	24.5	20.9	19.9	25.6	364	385
New York Central	October	2,211	2,178	2,280	2,231	28.8	26.5	26.0	27.9	483	514
	10 months	20,709	18,779	20,482	18,061	28.2	26.2	22.4	24.4	425	426
Pere Marquette	October	393	401	253	259	25.9	24.8	19.2	18.0	371	333
	10 months	3,437	3,386	2,278	2,131	26.4	24.3	15.7	18.2	322	329
Pittsburgh & Lake Erie	October	173	137	286	193	42.0	42.4	11.7	10.7	334	279
	10 months	1,261	1,280	1,934	1,847	42.3	41.1	8.4	9.2	244	248
Wabash	October	653	629	474	461	25.7	24.9	31.8	27.4	614	533
	10 months	5,803	5,218	4,092	3,419	25.1	23.6	26.6	26.7	524	466
Ohio-Indiana-Allegheny Region:											
Baltimore & Ohio	October	2,184	2,070	2,087	1,936	36.4	32.7	25.9	26.4	615	579
	10 months	19,828	16,585	18,185	14,887	34.7	33.3	24.6	23.1	577	504
Central of New Jersey	October	353	357	257	252	34.4	33.7	15.2	16.1	333	332
	10 months	3,194	3,028	2,203	2,041	33.9	33.1	13.8	13.5	299	277
Cleveland, Cincinnati, Chicago & St. Louis	October	727	768	622	673	29.5	30.2	31.4	32.5	580	640
	10 months	7,098	6,281	5,754	5,318	28.5	28.0	28.1	27.8	542	528
Pennsylvania System	October	5,321	5,387	5,092	4,999	36.0	33.9	23.3	23.3	548	530
	10 months	48,858	47,284	43,077	41,723	34.4	36.3	19.7	19.7	457	457
Philadelphia & Reading	October	734	683	717	708	38.7	38.4	22.7	22.0	578	544
	10 months	6,381	5,808	5,984	5,464	38.1	37.9	19.5	19.3	502	479
Pocahontas Region:											
Chesapeake & Ohio	October	912	917	1,163	1,144	42.8	40.2	34.2	33.1	867	785
	10 months	8,615	7,329	10,465	8,651	41.2	40.5	36.3	25.9	912	624
Norfolk & Western	October	949	862	1,130	1,046	43.4	39.6	36.2	34.6	986	852
	10 months	8,141	7,376	9,776	8,768	41.7	39.6	35.0	29.0	936	713
Southern Region:											
Atlantic Coast Line	October	603	670	294	312	22.3	21.0	24.1	23.5	372	338
	10 months	6,893	6,545	3,209	2,994	21.5	21.4	22.9	20.8	339	304
Illinois Central (including Yazoo & Mississippi Valley)	October	2,069	1,798	1,603	1,345	31.4	28.2	44.6	42.1	874	793
	10 months	19,449	14,872	14,588	11,218	29.2	26.9	41.2	32.9	815	611
Louisville & Nashville	October	1,632	1,634	871	876	31.3	29.7	31.1	30.1	621	596
	10 months	15,746	14,412	8,393	7,597	30.2	29.1	31.1	25.5	627	509
Seaboard Air Line	October	434	389	226	207	23.6	21.8	24.9	23.6	424	364
	10 months	4,623	3,875	2,412	1,934	23.1	22.0	22.1	20.5	368	322
Southern Railway	October	1,529	1,307	791	705	24.8	21.8	24.8	23.3	425	378
	10 months	14,899	11,210	7,976	5,976	23.6	22.2	23.7	20.6	409	339
Chicago & North Western	October	1,979	1,826	1,071	1,000	24.6	22.8	26.2	24.4	424	376
	10 months	17,396	14,994	9,786	8,502	25.8	24.6	22.1	20.3	387	335
Chicago, Milwaukee & St. Paul	October	1,888	1,993	1,232	1,301	26.2	24.5	34.2	30.0	594	513
	10 months	17,379	16,849	11,176	10,809	25.4	24.7	25.9	27.0	462	468
Chicago, St. Paul, Minneapolis & Omaha	October	361	411	179	212	24.4	24.4	23.8	31.8	434	555
	10 months	3,486	3,134	1,583	1,434	23.8	23.5	22.3	20.8	401	241
Great Northern	October	1,241	1,303	1,025	1,018	29.6	28.2	33.1	32.2	639	608
	10 months	10,218	9,513	8,153	7,588	28.8	28.7	27.7	23.3	549	458
Minneapolis, St. Paul & Sault Ste. Marie	October	658	710	374	379	25.2	22.7	28.3	32.0	491	531
	10 months	5,702	5,362	3,083	2,799	23.6	22.6	27.1	24.2	481	404
Northern Pacific	October	1,098	1,237	841	907	27.9	25.5	35.0	35.6	703	683
	10 months	9,839	9,283	7,580	7,058	27.2	26.8	33.8	27.1	672	520
Oregon-Washington R. R. & Navigation Co.	October	249	265	163	183	27.7	25.9	35.7	33.9	725	647
	10 months	2,506	2,147	1,764	1,460	28.1	26.2	30.8	27.1	668	538
Central Western Region:											
Atchison, Topeka & Santa Fe	October	1,957	2,092	1,158	1,246	22.3	21.6	39.6	40.2	579	576
	10 months	18,128	16,650	10,833	9,709	22.7	22.0	33.3	28.5	520	439
Chicago & Alton	October	382	379	217	226	26.8	27.3	23.8	23.3	415	423
	10 months	3,474	3,173	1,974	1,792	26.9	26.2	23.3	22.2	420	372
Chicago, Rock Island & Pacific	October	1,535	1,520	776	835	25.8	24.8	31.1	24.9	545	456
	10 months	14,496	12,830	7,445	6,432	36.3	23.5	20.2	24.7	469	417
Chicago, Burlington & Quincy	October	2,021	1,951	1,565	1,538	29.5	27.5	37.8	35.8	678	660
	10 months	17,703	15,612	13,764	11,921	28.5	27.0	31.8	27.5	618	502
Denver & Rio Grande	October	387	371	216	205	26.4	26.2	23.9	22.9	414	385
	10 months	3,005	2,697	1,841	1,569	29.4	28.9	20.1	15.0	408	289
Oregon Short Line	October	458	480	293	310	29.2	26.7	46.1	47.7	840	900
	10 months	4,260	3,702	2,972	2,458	29.4	27.3	46.5	34.3	958	660
Southern Pacific	October	1,469	1,297	977	915	25.4	24.8	37.1	37.8	652	663
	10 months	12,724	11,162	8,679	7,843	25.3	25.5	35.3	33.2	637	586
Union Pacific	October	1,644	1,536	1,052	982	25.2	23.0	84.0	75.4	1,414	1,173
	10 months	12,538	11,166	8,359	7,430	24.3	23.4	72.8	58.7	1,289	971
Southwestern Region:											
Missouri, Kansas & Texas	October	352	325	206	178	25.0	22.5	30.0	28.8	451	434
	10 months	3,273	3,081	1,901	1,673	23.8	23.3	28.5	24.6	418	350
Missouri, Kansas & Texas of Texas	October	302	284	148	107	25.3	23.0	21.9	14.4	352	234
	10 months	2,696	2,645	1,176	1,084	24.6	23.6	17.6	13.2	283	197
Missouri Pacific	October	1,262	1,216	843	755	27.3	25.5	24.8	27.1	494	491
	10 months	11,750	10,383	7,612	6,252	26.8	25.3	22.9	21.8	458	400
St. Louis-San Francisco	October	989	925	433	436	26.2	25.4	22.3	21.7	386	385
	10 months	9,203	8,267	4,161	3,716	25.8	25.0	21.1	19.0	371	325
Texas & Pacific	October	348	333	174	154	23.4	23.6	24.3	15.8	389	258
	10 months	3,363	3,471	1,640	1,520	23.4	23.0	21.8	19.2	357	308

Bureau of Statistics, December 23, 1920.

A New Rail Joint

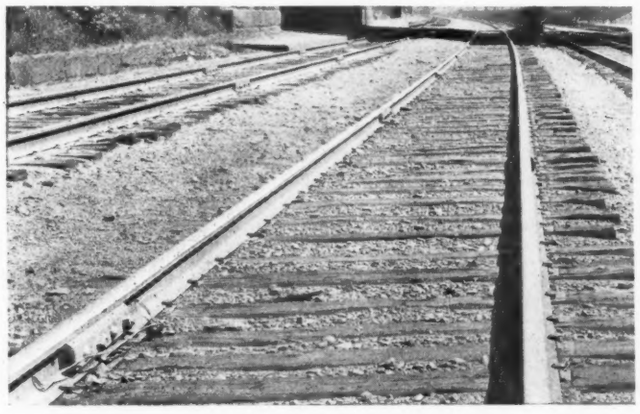
A RAIL SPLICE must fulfill two conflicting requirements: it must serve as a girder to provide continuous bean action of the rail across the joint and it must afford an efficient slip joint for ready adjustment for changes in temperature. One of the most interesting of the new designs of rail joints which has been offered as a new solution for this perplexing problem and which has been subjected to service trials recently is that now being placed on the mar-



Section Showing the Double Bar Arrangement

ket by the American Rail Joint Company, 141 Broadway, New York City.

The splice bars forming this joint are in two parts, the outer or channel-shaped part which engages the fishing surfaces of the rail and a smaller bar designed to fit the secondary fishing surfaces on the larger bar. The larger or channel-shaped bar is made with a relatively thin web which



An Installation of the New Rail Joint

is curved, as shown in the drawing, to afford considerable resilience for the purpose of spreading the two flanges of the bar apart, as may be necessary to obtain the proper adjustment of the fit against the fishing surfaces of the rail and to take up such wear as occurs in these contact surfaces. The agency for accomplishing this adjustment of fit is provided by the smaller bars of the joint which, when forced together by tightening up the bolts, serve to force the channel-shaped bars into a snug fit, not only against the fishing surfaces of the rail, but also against a considerable portion of the web. Another feature to which attention is drawn by the manufacturers of this splice is that portions of this joint, such as the inner bars, may be renewed independently of the rest of the joint, thereby effecting a considerable saving.

Rail joints of this type have been in service on tracks of the Boston & Albany over a distance of two miles for two years and nine months (the photograph shows a portion of this installation), while nine other roads have recently placed orders for joints of this kind to be used on a mile or more of track, each for further tests. The drawing shows the dimensions of this joint as applied to a 90-lb. A. R. A. Type-A rail, the section to which most of the recent orders for these joints will be applied.

North Pole Sanitary Drinking Fountains

THE HENRY GIESSEL COMPANY, Chicago, Ill., has developed and placed on the market several types of drinking fountains that have proved to be a sanitary and economical part of railway equipment. These fountains are of substantial construction, effect a considerable saving in

Porcelain Enameled Fountain for Passenger Coaches

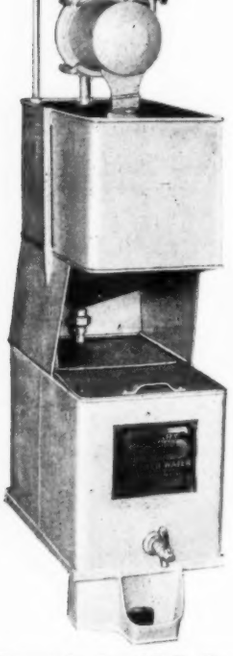
the amount of ice used and require only a minimum of attention at terminals.

There are several designs of fountain for use in passenger carrying equipment, one of the latest types being illustrated. The fountain for passenger coaches consists of a filter, shown at the top, a storage tank having a capacity of seventeen gallons and an ice chamber containing a cooling pan with a capacity of three cups so that only the water that is being used

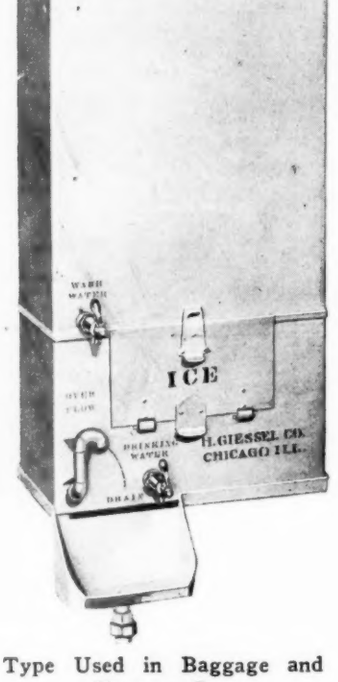
is cooled, thus effecting a great saving in the amount of ice required.

A fountain designed for use in mail cars which is made with or without a filtering apparatus is also shown and, being similar in construction to that used for passenger coaches, furnishes the employees of the railway mail service with sanitary drinking water. The fountain proper consists of a storage tank for filtered water and an ice compartment in the bottom of which is placed the cooling pan through which the water flows from the storage tank to the faucet. The water supply is drawn from the overhead tank of the car and, by gravity, passes through the filter on the top of the fountain into the storage tank and thence into the cooling tank.

These fountains require no steaming or cleansing during train operation as all that is necessary is to change the filter stones at terminals every seventy-two hours, simply replacing the stones with freshly sterilized ones. This operation requires only about ten minutes per car, the thorough cleansing and sterilizing of the entire apparatus being necessary only at infrequent intervals as the use of freshly sterilized filter stones meets all of the sanitary regulations in the various states and has been favorably passed upon by the United States Board of Health. However, provision is made for



Fountain for Mail Cars



Type Used in Baggage and Express Cars

convenient and thorough cleaning of all parts of the cooler. By the removal of five clamps, the filter casing may be removed and the filter stone taken out by unscrewing the pipe connection with which it is attached to the fixed end of the filter case. It is then easily and thoroughly cleaned by steam or by submerging in hot water. An opening is provided on the front of the storage tank near the bottom which is closed by a plug. Removal of this plug permits the interior of the tank to be cleaned by the insertion of a steam nozzle.

To drain the system, a cock is opened in the bottom of the cooling tank which permits the water in the storage tank to flow directly into the ice chamber and thus out through the drain.

An adaptation of this fountain for baggage, express and other cars where drinking water may be required also is shown. In addition to the supply of drinking water, a tank for wash water is provided. Besides the three tanks already mentioned, this company also manufactures a portable tank for locomotive tenders. This tank has an ice compartment as in the other fountains and thus provides pure water without contamination from ice which may be secured from sources where it is impossible to eliminate cinders or other impurities. In this tank the melted ice drains off and, as only a small portion of the water is in contact with the ice at any one time, the economy of the cooler is apparent. As shown in the illustration, a bracket is permanently attached

Special Cooler for Locomotive Tenders

to the tender and sockets are provided on the tank so that it may be securely suspended from the bracket and thus withstand the shocks incident to the operation of the locomotive.

A filter operating in a manner similar to the filter used with these fountains, is manufactured by the Giessel Company for use in conjunction with the Giessel standard cooling pan and makes a complete filtering and cooling apparatus for dining cars. These filters and fountains are in use on a large number of railroad cars on a number of the larger railroads in the United States and observations made by two of the largest roads show that 25 lb. of ice is sufficient for a run of 500 miles. These fountains are made of cast iron, white porcelain enamel, are easily kept clean and add to the interior finish of a car.

Photo by Keystone View Co.

Station at Peking, China

General News Department

President Wilson has sent to the Senate the nomination of W. L. Chambers for reappointment as a member of the United States Board of Mediation and Conciliation.

The shops of the Louisville & Nashville, at Etowah, Tenn., were destroyed by fire on December 21; estimated loss, including machinery and damage to locomotives, $100,000.

The Senate, on December 27, adopted a resolution by Senator Nelson, of Minnesota, calling on the Interstate Commerce Commission to report to the Senate the increased cost of railroad fuel for the current year over the cost for the year 1919.

The Earl of Bessborough, chairman of the board of the London, Brighton & South Coast, died suddenly on December 1. Lord Bessborough was in his seventieth year. He joined the board of the London, Brighton & South Coast in 1896 and succeeded Lord Cottesloe as chairman in 1908.

Engineering Council has issued in booklet form its recommended uniform law for the registration of architects, engineers and land surveyors. While this organization is not advocating the registration of engineers, it has prepared this law, which it is offering in those states where such legislation is under consideration for the purpose of promoting uniformity in legislation of this character.

The committee on appropriations of the House of Representatives has recommended an appropriation for the Interstate Commerce Commission for the fiscal year 1922 of $4,893,100, which is $200,000 more than was appropriated for 1921, but $681,400 less than the commission estimated would be required. For the Railroad Labor Board the committee recommended $400,000, or $150,000 less than was asked. For the Alaska government railroad the committee recommended $4,000,000.

The Transportation Club of Tulsa, Okla., has elected the following officers: J. A. Bernier, of the Kerr Glass Manufacturing Company, president; H. J. Conley, of the Bay State Refining Company, first vice-president; R. V. Miller, general agent of the Wabash, second vice-president; E. C. Kitching, division freight agent of the Atchison, Topeka & Santa Fe, third vice-president; R. C. Hughes, of the Wabash, secretary; J. M. Usher, of the Price Sand Company, treasurer; L. M. Klein, of the Gulf Pipe Line Company, once the Gypsy Oil Company, director for three years; A. C. Holmes, of the Empire Refineries, Inc., director for two years; W. O. Allen, of the Kerr Glass Manufacturing Company, director for one year.

Samuel Rea, president of the Pennsylvania Railroad, has ordered a general curtailment of expenses. He says: "Conditions now confronting the Pennsylvania and other railroads make it essential to observe the utmost economy consistent with safety and efficiency. Traffic has already declined and unmistakable indications exist of a slowing up of business. It is very important that the situation should be clearly understood by the employees and the public. It is hoped that such reduction in business as may take place will continue for only a brief period, but this condition has already involved curtailment, and will necessitate further reduction in the number of employees and in the working expenses and capital expenditures until the situation improves."

The Chicago Safety Council recently organized a Steam Transportation Committee, which held its first meeting on December 21. At this meeting a general discussion took place as to the general activities which the committee would undertake. It was explained, however, that it was the intention that action should be taken as heretofore by individual roads regarding specific matters and an attempt be made to bring about the desired improvement or adjustment without referring matters to this committee for handling, except in special cases. C. L. Hinkle, general manager of the Chicago Great Western, is chairman of the committee, the personnel of which is representative of all the railroads in the city. Meetings of the committee are to be held once each month on the second Friday of the month at 12:30 p. m. in the Sherman Hotel, Chicago.

Representatives of State Manufacturers' Associations are to hold a convention at the Congress Hotel, Chicago, on January 21, to discuss the proposition of the railway brotherhoods for the creation of a National Adjustment Board. Believing that such domination of the labor unions means the destruction of discipline, efficiency and loyalty, the manufacturers hold that if the railroads are thus shackled, the resulting conditions must necessarily be reflected in the organization of every manufacturer; and all industrial associations, the purpose of which is the general good of the manufacturing interests, and all corporations, firms and individuals having to do with the production of manufactured articles, and all employers' associations and employers, are requested to send delegates to the convention. It is proposed to "formulate a clear and fearless expression of opinion," appoint proper committees to carry out the conclusions, and take such steps as will bring to the attention of the country the serious situation that will follow, should the railroad brotherhoods succeed in carrying out their purpose. The president of the manufacturers' organization is William Butterworth, Moline, Illinois, and the secretary is John M. Glenn, Chicago.

Mexican Roads in Per Diem Agreement

J. E. Fairbanks, secretary of the American Railway Association, announces that the National Railways of Mexico and Operated Lines (Mexican Government Administration), have settled certain claims for value of cars delivered to them prior to January 1, 1918, and that they are now restored to membership in the American Railway Association and to the per diem agreement.

Cars belonging to American and Canadian railroads which were delivered to Mexican railroads prior to January 1, 1918, are to be considered as sold to the Mexican roads at their cost price, less depreciation, with 5 per cent simple interest from the date of delivery of the car. All repair bills in connection with such cars are to be canceled. All Mexican cars upon American railroads are to be returned to Mexico as promptly as possible without any transportation charge, but the Mexican railways are to pay, without interest, the repair bills due to American or Canadian railroads. Any Mexican cars destroyed on American railways prior to July 1, 1919, are to be paid for at book value, less depreciation, with 5 per cent simple interest from date of destruction. All per diem charges are to be mutually canceled. The Mexican railways are to make an initial payment of 25 per cent within thirty days and the balance in three equal instalments, six months apart.

Owing to the failure to return cars or to pay per diem, the National Railways of Mexico were suspended from the per diem rules agreement on January 1, 1919. There were many unsettled accounts for repairs and for per diem balances.

A total of 468 American freight cars is involved in this settlement, valued at approximately $388,000, and the estimated interest due to January 1, 1921, is approximately $98,000. The National Railways of Mexico will now settle with American railroads on the basis of the American per diem rate of one dollar per car per day.

Train Robbers Caught

The northbound through express of the Illinois Central was boarded by two robbers near Gilman, Ill., on the night of December 28, and money and valuables were taken from 30 or more passengers in a sleeping car. At Kankakee, 25 miles north of Gilman, the robbers escaped, but later were apprehended at Aroma Park, about four miles away. The robbers were twin brothers, Jose and Jacob Scott. From Kankakee they intended, it is believed, to rob a southbound train on the Big Four; but the agent at Aroma Park telegraphed a warning that two men resembling the robbers were in his waiting room. Police arrived as the Big Four train pulled in and chased Jacob Scott through the train into a wash room, firing through the walls until the robber was mortally wounded. The other one surrendered. Several hundred dollars in cash and jewelry were recovered.

Railroad Administration Announces Settlements

The United States Railroad Administration announced on December 29 that it had recently made the following final settlements for claims arising from federal control and paid out to the several railroads the following amounts: Abilene & Southern, $150,000; Buffalo, Rochester & Pittsburgh, $1,000,000; Cincinnati, Indianapolis & Western, $40,000; Spokane, Portland & Seattle, $1,600,000; Fort Dodge, Des Moines & Southern, $300,000; El Paso Union Passenger Depot, $5,665.86; Sioux City Bridge Company, $98,546.92; Northwestern Pacific, $525,000; Mississippi Central, $220,000; Louisiana & Mississippi Railroad & Transfer, $33,231.81; Chicago, Milwaukee & St. Paul, $13,750,000; St. Louis National Stock Yards, $100,000; Eastern Steamship Lines, $250,000. The payment of claims on final settlement is largely made up of balance of compensation due, but includes all other disputed items as between the railroads and the Administration during the 26 months of federal control. Eighty-seven roads have now filed their final claims.

Woolley Retires from Interstate Commerce Commission

The term of office of Robert W. Woolley as a member of the Interstate Commerce Commission expires on December 31 and he has not been reappointed. In a recent statement to the press Mr. Woolley said he had notified the President that he did not wish to be reappointed. He was appointed on September 29, 1917, for the unexpired term of the late Judson C. Clements. This leaves two vacancies on the commission, as James Duncan, vice-president of the American Federation of Labor, did not accept his recess appointment. Mark W. Potter and Henry Jones Ford, who have been serving under recess appointments, have not been confirmed by the Senate, although the President sent their nominations, together with that of Mr. Duncan, to the Senate at the opening of the new session. As it is understood the Senate does not intend to confirm the President's appointments, it appears that the new President will have an opportunity to appoint four commissioners.

A. S. C. E. Joins in Dissolution of Engineering Council

The board of direction of the American Society of Civil Engineers has reconsidered its resolution of November 9, regarding the dissolution of the Engineering Council. As it now appears that participating societies, such as the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Institute of Mining and Metallurgical Engineers, may discontinue their work in the Engineering Council as a consequence of their having joined the Federated American Engineering Societies, it was resolved that the representation of the A. S. C. E. be authorized to join with a majority of the member societies in action to terminate the existence of the Engineering Council at the end of the year 1920.

Among other matters the board also appointed a special committee on bridge design and construction, which is to confer and co-operate with similar committees of such societies as the A. R. E. A., etc. The members at present consist of H. C. Baird, J. E. Greiner, C. W. Hudson, M. S. Ketchum, F. E. Turneaure, A. F. Robinson, H. B. Seaman, B. R. Leffler and J. R. Worcester.

The annual meeting of the society will be held on January 19 and 20, 1921, at 33 West Thirty-ninth street, the headquarters of this society. It will be called to order at 10 a. m.

Work of the American Engineering Council

The second meeting of the executive board of the American Engineering Council was held in New York on December 17, 1920, with President Herbert Hoover presiding. Districts 1 and 2 were represented by W. B. Powell, of the Buffalo Engineering Society, and Gardner S. Williams, of the Detroit Engineering Society. The committee on the nomination for secretary asked for more time and secured it. As a result of the dissolution of the Engineering Council, the chair was authorized to appoint the present committees of that body to continue to function as committees of the new organization. A small appropriation was made for publicity and the committee on this work authorized to appoint a co-operating board of engineering editors. The board, in answer to a communication from the American Association of Engineers asking them to send a representative to a national conference on engineering publicity, resolved that it was the sense of the meeting that, though the American Engineering Council would be glad to co-operate, they were not yet sufficiently organized to send a representative. Mr. Hoover presented the results of numerous visits throughout the country as regards the trend of engineering societies in this federation movement. He found a general desire towards the movement, but that it hinged more on territorial organization than on national. He also discussed the question of dues as complicated by this question. The board voted that it did not desire to become a member of the United States Chamber of Commerce, feeling that it could do better work by being independent, though it would be glad to co-operate whenever there was need.

Causes of South Pittston Collisions

The two collisions which occurred on the Lackawanna & Wyoming Valley (electric) road at South Pittston, Pa., on July 3, 1920, caused 17 deaths (not 22, as reported at the time) and the investigations, of the Interstate Commerce Commission find that responsibility for the cause—failure to protect trains by flag—rests on a half dozen individuals.

The road is double track. The grade is undulating, but at the point of collision was descending (northward) about two per cent. The trains involved were northbound No. 6, No. 21, No. 3, and No. 4, each consisting of one or two cars. They left Wilkesbarre in this order in the afternoon at 6:10, 6:25, 6:32 and 6:50. No. 6, after leaving Inkerman at 6:28 p. m., five minutes late, was run for some distance very slowly to permit the conductor to collect fares, and while moving at from 15 to 25 miles an hour was struck by the following train, No. 21, moving at about 35 miles an hour. The conductor of No. 6 was fatally injured. Train No. 3, following, was flagged by the conductor of No. 21; it was moved forward, picked up the injured conductor, was set back to Yatesville crossover, and then proceeded northward on the southbound track, having got leave over the telephone, orally, to do so. No. 3 had been properly flagged by No. 21, but after No. 3 crossed over to the southbound track, the northbound track was left without a flagman, and train No. 4 came on and ran into the rear of No. 21, crushing the rear car of the standing train.

Negligence and disregard of rules appear in the narrative of the testimony of nearly all of the men interested. The most specific point is that the men in charge of No. 3, after clearing the northbound track, assumed, without warrant, that the train despatcher had arranged for a single-track operation and that therefore there was no need of flagging train No. 4. The motorman of the latter did not see the rear end of train No. 21 until he was within 200 ft. of it, and his train was moving at 40 miles an hour, or faster.

There was no block system. Train No. 6 had fallen back on the time of No. 21, and, according to the rules, should have been protected by flag or fusee, no arrangement being provided, apparently, for maintaining a time interval at any station. All of the trainmen were experienced and all but one had been in the service at least nine years. The train despatcher, who is held in some degree at fault, was employed as operator in 1909 and promoted to despatcher in 1918.

Traffic News

Two complete sugar mills and a crusher, 41 carloads, were recently moved from Buffalo, N. Y., to Havana, Cuba, in eleven days. The train was run from Buffalo over the Lehigh Valley to Allentown, Pa., in 30 hours. Moving over the Reading, the Western Maryland, the Norfolk & Western, the Atlantic Coast Line and the Florida East Coast, it reached Key West ten days later, and Cuba, by car ferries, on the following morning. The freight charges on the shipment amounted to $37,179.

The Car Service Division of the American Railway Association has announced that beginning January 1, 1921, the railroads will be permitted to accept for shipment into Mexico small arms and small arms ammunition. The circular is a modification of previous orders, issued by the Car Service Division in compliance with the President's proclamation of July 12, 1919, which placed an embargo on shipments to Mexico of all arms and ammunition except such as are authorized by the United States government. The change permitting shipments was made at the request of the state department.

Passenger and freight rates will be reduced throughout Canada on January 1, in accordance with the provisions of the order by which the Board of Railway Commissioners authorized advances last September, the board having denied recent petitions to suspend or postpone the advances. The September order granted an increase in passenger rates of 20 per cent applicable to the end of 1920. From now until July 1, 1921, the increase will be 10 per cent instead of 20; and on July 1 the rates are to come back to the basis in effect prior to the issuance of the order. There will be no reduction in the increase granted in parlor and sleeping car rates and excess baggage. On freight there was a general increase in eastern territory of 40 per cent; this will now drop to 35 per cent; and the increase of 35 per cent in western territory will drop to 30 per cent.

"Clyde-Southern Special" is the name of a rail and water route just announced by the freight department of the Southern Railway and the Clyde Steamship Company, to begin service on January 15, 1921. Freight shipped from New York and Boston by Clyde steamships to Charleston, S. C., and Jacksonville, Fla., will be taken by the Southern on fast freight trains to the west and southwest. Through package cars will be run to 22 of the principal commercial centers and distributing points of the South. There will be three sailings weekly from New York and one from Boston. Package cars will deliver freight in Augusta, Columbia, Spartanburg and Greenville on the third day after leaving New York; Atlanta and Athens, fourth day; Birmingham, Selma, Meridian, Chattanooga, Knoxville, Columbus, Ga., and Montgomery, fifth day; Mobile, New Orleans and Memphis, sixth day; Little Rock, seventh day, and Oklahoma City, eighth day. From Jacksonville package cars will give fourth day delivery in Valdosta, Cordele and Macon.

New York State Passenger Fares

The injunction secured by the officers of the state and the city of New York against the general increase of passenger fares, as ordered by the Interstate Commerce Commission, is still in effect so far as concerns the Long Island Railroad and the Staten Island Rapid Transit Company, Justice Russell Benedict, of the Supreme Court, having on December 24 refused to decide the case until there could be a final hearing on the question of making the injunction permanent. Justice Benedict's decision fills 40 typewritten pages. He declares that the sovereign rights of the state are in danger from the encroachments of the federal government.

The Long Island contends that it is now carrying passengers at unreasonably low rates; and officers of the company fear that unless the desired advances can be made, they will be confronted with the problem of reducing expenses or diminishing the number of trains. The Long Island derives 70 per cent of its revenue from passenger traffic.

Coal Production

Production of soft coal during the week of December 18 is estimated by the Geological Survey at 12,184,000 net tons. Cumulative production for the calendar year up to December 11 now stands at 537,555,000 net tons, as against 536,288,000 for 1917, 566,349,000 for 1918 and 441,592,000 for 1919. If the rate of production be continued for the balance of the year, the total output will be 555,000,000 tons. The percentage of full time output lost on account of transportation disability during the week of December 11 was 18½ per cent. Final data on the tonnage of bituminous coal dumped over Lake Erie piers during the season show a total of 23,667,138 net tons, an increase of 916,746 over 1919, but a decrease of 5,721,104 in 1918.

Anthracite Shipments in November

The shipments of anthracite in November, as reported to the Anthracite Bureau of Information, amounted to 5,765,347 gross tons, against 6,240,901 tons in October, a decrease of 475,554 tons. The decrease was due entirely to the fewer number of working days in November, as, because of election day and holidays last month the collieries were operated only 21 days, whereas in Ostober there were 24 days of active operation. For each working day in November the average shipments were 274,540 tons, as compared with 260,033 tons in October.

Shipments by originating carriers were as follows:

	November, 1920	October, 1920
P. & R. R. W.	1,238,994	1,317,070
L. V. R. R.	1,002,329	1,180,270
C. R. R. of N. J.	453,139	486,609
D. L. & W. R. R.	792,157	846,054
D. & H. Co.	814,167	893,058
Penna R. R.	424,745	484,940
Erie R. R.	603,766	531,598
N. Y. O. & W. R. W.	175,074	190,958
L. & N. E. R. R.	260,976	310,344
Total	5,765,347	6,240,901

Illinois Commuters Fight Increased Rates

That the petition to the Interstate Commerce Commission of railroads operating between Chicago and its suburbs for 20 per cent increase in commutation fares will be vigorously opposed by commuters and the state was indicated at hearings on this subject held at Chicago on December 18 and 20 by W. A. Disque, attorney-examiner of the Commission. Following the second day's hearing, it was agreed that the case be resumed at Washington on January 13. In the meantime, attorneys for both sides of the controversy will prepare their briefs for presentation at that time.

Morton Culver, assistant attorney-general of Illinois, H. W. Slater, railroad expert, and Mathew Mills, attorney for the State Commission, are handling the case for the state and it is probable that its defense will be based on the allegation: (1) That the railroads have not made proper application to the state public utilities commission and that they are not therefore legally entitled to the increase. (2) That the railroads are making money at the present rates and are therefore not entitled to the increase. (3) That the suburbanites have been induced to settle in Chicago's outlying districts on the supposition that they would be given reasonable rates into the city and it would be a violation of public policy to increase commutation rates at the present time.

The carrier's side of the controversy is being directed by R. V. Fletcher, general solicitor of the Illinois Central, who based arguments for the petition on the unfavorable relation of the revenues derived from suburban passenger traffic to the expense of maintaining that service.

During the progress of the Chicago hearings voluminous evidence, showing the losses sustained by the eight railroads handling this traffic out of Chicago, was presented. In answer to part of this testimony the charges were made that these losses were sustained because of the large number of passengers carried on passes and because of the unnecessary expenses incurred at suburban stations.

Representatives of the carriers are looking for a quick decision after the resumption of the hearings at Washington.

Commission and Court News

Interstate Commerce Commission

The commission has further suspended until January 29 the operation of the proposed cancellation of the existing provisions for the absorption of handling charges on rice and rice products at New Orleans, Gretna, Harvey and Westwego, La., for export and coastwise traffic.

The commission has suspended to May 15 the operation of certain schedules contained in a tariff issued by the El Paso & Southwestern, which increase the charges for diversions and reconsignment of fruits and vegetables and other commodities and restrict the number of diversions and back haul privileges.

The commission has suspended until April 23 the operation of certain schedules appearing in F. A. Leland, agent's tariff, which would make an increase of 35 per cent over rates in effect on August 25, 1920, from points in Texas to destinations in defined territories, in lieu of the present inter-territorial percentage increase of 33⅓ per cent.

The Railroad Commission of California has refused authority to the American Express Company to increase its rates. The company had applied for an increase of 13 per cent in order that the California rates would harmonize with the increase recently granted by the Interstate Commerce Commission. In refusing the increase, the California commission stated that the affirmative showing from the express company as to the reasonableness of the proposed new rates had not been produced. It was also brought out at the hearing that operating costs are lower in Zone 5, comprising the states of California, Oregon and Washington, than in the other zones.

The Public Service Commission of Oregon has filed a petition with the Interstate Commerce Commission asking for a preliminary order requiring the continued use by the Great Northern and the Spokane, Portland & Seattle of the terminal facilities of the Northern Pacific Terminal Company in Portland, Ore., as now used by certain trains of these companies, in accordance with the practice adopted during federal control. On December 28, Commissioner Aitchison telegraphed the Oregon commission that the presidents of the Union Pacific and the Southern Pacific had acceded to the commissioner's request that the vacation order to those roads be postponed for a reasonable length of time pending the commission's investigation. Chairman Clark of the commission, will expedite the hearing as much as possible.

State Commissions

The Railroad Commission of Louisiana, by Circular No. 710, has notified all railroads in the state that violations of orders of the commission establishing rates within the state which are not specifically covered by the decision of the Interstate Commerce Commission in the Natchez case, will be promptly punished by the imposition of penalties as prescribed by law. Carload rates on certain commodities have been published without authority.

The Southern Pacific has applied to the Railroad Commission of California to change the switching limit, for the handling of yard traffic at San Francisco. The application was filed in compliance with an order issued by the commission, in accordance with which the Southern Pacific was to remove discriminations in switching charges existing between San Francisco and South San Francisco. The Southern Pacific was required to place South San Francisco within the San Francisco switching limits and to apply all switching rates pertaining to San Francisco to South San Francisco also. The company's application proposes that the intrayard switching charge between South San Francisco and San Francisco be reduced from 80 cents to 70 cents per ton, and that the minimum charge be reduced from $15 to $12. The company also requests authority to cancel the present rate of 37½ cents per ton, now applying between San Francisco and South San Francisco on traffic delivered to the State Belt Railroad when destined to points beyond by water route, and asks permission to increase this charge to 70 cents per ton.

Personnel of Commissions

President Wilson on December 7 sent to the Senate the nominations of Henry Ford Jones, Mark W. Potter and James Duncan for membership on the Interstate Commerce Commission. Professor Jones and Mr. Potter have been serving as members of the commission under recess appointments announced after the Senate had failed to confirm the original appointments. Mr. Duncan declined to serve under a recess appointment. It is the general understanding that the Senate intends to withhold its confirmation of the President's appointees at this session.

The New York State Public Service Commission, Second District, has consolidated its divisions covering steam and electric railroads into the Division of Railroads with Charles R. Vanneman, chief of the Division of Steam Railroads, the chief of the Consolidated divisions, and Ray G. Winans, assistant inspector, as chief inspector of electric railroads. Charles R. Barnes, chief of the Division of Electric Railroads, resigned recently to become the head of the commission operating the street car lines in Rochester. Mr. Winans was assistant to Mr. Barnes. Mr. Vanneman has been with the commission since March 3, 1910, when he was appointed as inspector of the Division of Transportation. In 1914 he was promoted to be chief of the division of Steam Railroads. He has supervision over grade crossing work.

Court News

Railroad's Duty to Collect Freight Charges

Coal was shipped in interstate commerce without prepayment of freight; the last carrier paid back charges; the consignee refused to accept the coal or pay the charges, and the coal, when sold, did not bring sufficient to satisfy the charges. The last carrier was held entitled, and under duty, to save itself from penalty, to enforce collection of the charges from the shipper.—Central of Georgia v. Lovell, 180 N. Y. Supp. 922.

Safety Appliance Acts—
Flanges of Locomotive Wheels

In an action for the death of a fireman alleged to be due to defects in a flange on a locomotive wheel which caused a derailment, the Texas Supreme Court holds that under the Federal Safety Appliance Acts, and rules and regulations of the Interstate Commerce Commission, thereunder prescribing with particularity the extent of wear on the flange of a locomotive wheel which renders it defective, the railroad was not negligent where the flanges of the wheel were in accordance with such rules. The question of whether the railroad exercised ordinary care to keep the flanges safe for the operation of the locomotive is not the test of negligence in such a case.—Lancaster & Wight v. Allen (Tex.), 217 S. W., 1032.

Right to Refuse to Accept Commodity for Carriage Is a Judicial Question

Manufacturers of silk sought to restrain the Director General's order of February 29, 1920, amending the Consolidated Freight Classification by canceling ratings on silk and placing silk in the list of commodities that will not be accepted for carriage by freight. The Circuit Court of Appeals, Second Circuit, held the plaintiffs entitled to a preliminary injunction, restraining enforcement of the order, since what was complained of was not a question of rates, fares, charges, classifications, regulations, or practices, or changes therein, which would be an administrative subject within the cognizance of the Interstate Commerce Commission, but was, not merely a temporary embargo, but a permanent prohibition of the carriage of silk at all, and therefore was a judicial question, within the cognizance of the courts.—Cheney Bros. v. Hines, 266 Fed. 210.

Foreign Railway News

English Railwaymen's Spare Time Jobs

LONDON.

Complaints have been received by the railway union leaders in England that railwaymen are in their spare time working at gardening, painting, farming, and as musicians. Mr. Cramp, industrial secretary of the National Union of Railwaymen, is urging the branch officers of the union to stamp out the practice, and states that they did not fight for an eight-hour day in order to prevent other men from obtaining a living.

New Rolling Stock for New Zealand Railways

LONDON.

The government of New Zealand has just signed a contract with the North British Locomotive Company for the delivery of 25 Pacific type locomotives at a price of $43,225 each. The weight of the locomotives will be 190,000 lb. in working order. Cammell Laird & Co. have received the contract for the delivery of 2,500 eight-ton freight cars at a price of $1,139.75 per car. In addition to the above, there are under construction in New Zealand, by Price Brothers, Thames, 20 locomotives of the Pacific type, similar in every respect to those to be supplied by the North British; also, ten of the same type to be built in the government's own workshops. The government is now calling for bids for 1,000 additional freight cars to be built in New Zealand.

Spanish Railways to Order Rolling Stock

LONDON.

The Times (London) trade supplement states that the ministry of public works of Madrid, Spain, has announced that on January 15, 1921, an opportunity will be offered to foreign firms to secure orders for 119 railway engines and tenders needed by the Spanish railways. Estimates must be handed personally by a duly accredited representative of the firm making the offer, between 10 and noon on the day of January 15 at the ministry of public works, Madrid. The principal condition of the contract is that the engines must be delivered within ten months.

The Spanish government is also advertising for bids, which will close January 25, for 3,500 freight cars to be supplied to the government railways, according to cable advices received last week from Commercial Attache Cunningham, at Madrid.

Electrification on the Midi Line, France

LONDON.

The Midi Railway is considering electrifying the following main lines: Toulouse to Tarbes, Pau, Bayonnes, about 220 miles; and Bordeaux to Dax, Hendaye, about 160 miles. Branch lines to be electrified are: Toulouse to Auch, 60 miles; and Montrejeau in Bagneres-de-Luchon, 24 miles. If the full plans of the chief engineer of the Midi Railway are carried out, about 1,000 miles of main and branch lines will be electrified between 1920 and 1925. The necessary power will be obtained from the Pyrenees, partly from two stations at Soulom and Eget, in the Hautes-Pyrenees, which are already working, and partly from three new stations in the valley of Ossau, Basses-Pyrenees. Between 1925 and 1930 two further groups of lines will be electrified. The first group, comprising 370 miles, will be supplied by two existing power stations at La Cassagne and Fontpedrouse, in the valley of the Tet (Pyrenees-Orientales); by three new stations in the same valley—Olette, Fontpedrouse and Les Bouillouses—and by three new stations in the valley of the Ariege—Ax-les-Thermes, Merens and Saillans. The second group, consisting of 370 miles, will be supplied by seven power stations which are to be constructed in the Cevennes.

Equipment and Supplies

Car Production—Eleven Months' Figures

The production of freight cars for domestic service in November by the car building companies reporting to the Railway Car Manufacturers' Association, totaled 5,902, as compared with 5,999 in October. The total for the first eleven months of the year was 39,486. The deliveries of passenger cars totaled 48, as compared with 21 in October and 38 in September.

The figures for the month and the accumulative figures for the eleven months are as follows:

TABLE I—CARS DELIVERED

	Freight cars		Passenger cars	
	Domestic	Foreign	Domestic	Foreign
January	4,482	1,904	1	9
February	3,774	1,039	4	..
March	2,796	1,994	11	28
April	2,127	1,912	15	..
May	2,636	1,387	..	..
June	2,608	708	..	21
July	2,583	380	18	27
August	3,056	1,184	21	13
September	3,529	1,088	38	..
October	5,999	668	21	13
November	5,902	976	48	7

TABLE II—CARS ON ORDER AND UNDELIVERED

(Figures for end of month)

	Freight cars			Passenger cars		
	Domestic	Foreign	Total	Domestic	Foreign	Total
December, 1919	24,816	10,720	35,536	407	110	517
January, 1920	27,282	9,381	36,663	311	103	414
February	29,706	8,389	38,095	282	103	385
March	33,061	7,854	41,455	522	80	602
April	42,869	7,180	50,049	586	88	674
May	47,761	6,338	54,099	732	110	842
June	48,171	7,792	55,963	796	97	893
July	50,275	8,212	58,487	811	88	899
August	49,442	7,574	57,016	861	75	936
September	48,114	6,793	54,907	903	75	978
October	46,051	7,026	53,077	851	66	917
November	41,290	6,234	47,524	925	59	416

TABLE III—FREIGHT CAR REPAIRS

	Delivered during month	Delivered Jan. 1 to end of month	On order and undelivered at end of month
May	2,296	10,442	20,130
June	2,541	12,983	24,092
July	2,491	15,474	23,541
August	2,818	19,269	27,031
September	3,140	21,260	26,710
October	3,945	25,205	27,779
November	4,345	29,550	25,663*

* Exclusive of 553 for foreign companies, making a total of 26,216.

Locomotives

THE SOUTHERN RAILWAY, reported in the *Railway Age* of October 22, as asking for prices on 50 locomotives, is now inquiring for 50 Mikado type locomotives and 10 Mountain type locomotives.

Freight Cars

THE UNITED FRUIT COMPANY, Pier 9, North River, New York, has ordered 3, 5,000-gal. tank cars from the General American Tank Car Corporation.

THE SOUTHERN RAILWAY, reported in the *Railway Age* of October 15, as asking for prices on 2,500 box cars of 40 tons capacity, has renewed its inquiry for this equipment.

THE WEST INDIA SUGAR FINANCE CORPORATION, 129 Front street, New York, has ordered 1, 5,000-gal. capacity, narrow-gage tank car, from the General American Tank Car Corporation, for export to Santo Domingo.

Iron and Steel

THE NEW YORK CENTRAL has ordered 71,500 tons of rails from the Illinois Steel Company; also, 11,000 tons from the Carnegie

Steel Company, and will place additional orders for 93,000 tons for its 1921 requirements.

THE PENNSYLVANIA SYSTEM'S order for 150,000 tons of rails for its 1921 requirements, reported in the *Railway Age* of December 3, was divided as follows: Carnegie Steel Company, 45,000 tons; Cambria Steel Company, 45,000 tons; Lackawanna Steel Company, 10,000 tons, and the Bethlehem Steel Company, 50,000 tons.

Signaling

THE PENNSYLVANIA is installing a complete new twenty-three lever Union electro-pneumatic interlocking machine at "AR" Tower, Gallitzin, Pa.

THE PENNSYLVANIA is installing a Union 23-lever electro-pneumatic interlocking machine at Gallitzin, Pa.; 17 working levers and six spare spaces.

THE MISSOURI, KANSAS & TEXAS plans to install automatic block signals on its lines between Parsons, Kan., and Wyborg, Okla., and between McAlester, Okla., and Springtown, a total of 100 miles of road.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS has ordered from the Union Switch & Signal Company mechanical interlocking machines for Crestline, Ohio; Ansonia, Ohio, and Harvard, Ohio; 36 levers, 39 levers and 34 levers, respectively; and the two last mentioned have each six electric levers.

Trade Publications

THERMIT WELDING.—An instruction book, especially prepared for use by men actually performing thermit welding repairs in railroad shops, has recently been issued by the Metal & Thermit Corporation, New York. This booklet, which is known as Pamphlet No. 41, is of convenient pocket size for ready reference.

LEATHER BELTING.—The manufacture and renovation of leather belting are treated in Catalogue No. 12 of the Consolidated Belting Company, Philadelphia, Pa. A valuable feature of the catalogue is a concise discussion of belting problems and their solution and formulas for calculating the proper sizes and speeds for belts.

LUBRICATION.—Technical discussions of lubrication and the use of lubricating oils in various industries form the subjects of the articles in the monthly publication of the Texas Company, New York City. This magazine is distributed without cost to those who are especially interested in the use and selection of lubricants.

RADIAL DRILLS.—The Western Machine Tool Works, Holland, Mich., has recently issued Catalogue No. 21, in which its line of plain and universal radial drills is fully described and illustrated. The special feature of these drills is the low hung drive in which the spindle driving gear is located at the lower end of the spindle just above the socket.

INCREMENT BORER.—Keuffel & Esser Co., New York, has reissued its eight-page pamphlet on the Swedish Increment Borer, with a new price list. This pamphlet describes a small instrument for obtaining core drill specimens from trees or timber for the purpose of determining density or other qualities of the timber, depth of penetration of preservatives, etc.

FARLOW DRAFT ATTACHMENTS.—Under this title, the T. H. Symington Company, Chicago, has just issued a circular in which the Farlow attachments for application with the Type "D" coupler and friction draft gear are briefly described and their construction clearly illustrated. The circular contains four pages and has received general distribution.

CINDER HANDLING PLANTS.—The Roberts & Schaefer Company, Chicago, has issued a 16-page pamphlet known as Bulletin No. 39, illustrating and describing several types of equipment manufactured and installed by that company for the handling of cinders from locomotive cinder pits. These include simple conveyors for dumping into cars on an adjacent track as well as more elaborate forms of equipment for conveying cinder from pits under a number of tracks to storage bins of several thousand cubic feet capacity.

Supply Trade News

Fred N. Baylies, general sales agent of the **P. & M. Company,** Chicago, has been elected vice-president of the company, in addition to his other duties, effective December 21.

Lucian C. Brown and **George W. Brown,** 50 Church street, New York City, have been appointed representatives in the New York district of the **Edgewater Steel Company,** Pittsburgh, Pa.

Harry C. Holloway, secretary and general manager of the **Maintenance Equipment Company,** Chicago, has been elected vice-president, in addition to his other duties, effective December 21.

Harry F. Lowman, vice-president of the **Bradford Draft Gear Company,** New York, will transfer his headquarters on January 1, from New York to the Munsey building, Washington, D. C.

Howard C. Mull, manager of the sales department of the Verona Tool Works, Pittsburgh, Pa., with headquarters at Chicago, has been appointed manager of the railway department of the **Reliance Manufacturing Company,** of Massilon, Ohio, with offices at Chicago, effective January 1. Mr. Mull was born on July 13, 1889, at Cincinnati, Ohio, and entered railway service in the engineering department of the Cleveland, Cincinnati, Chicago & St. Louis, in 1910. Two years later he was transferred to Cleveland, Ohio, and placed in charge of safety matters. In May, 1913, he entered the employ of the Verona Tool Works, and two years later was promoted to representative of sales, western territory, with headquarters at Chicago. In 1918, he was appointed manager of sales, with headquarters at Chicago, the position he occupied at the time of his recent appointment.

H. C. Mull

R. J. Hinkle has been appointed railroad representative of the **Garlock Packing Company,** Palmyra, N. Y., with headquarters at Philadelphia. Mr. Hinkle's territory embraces the eastern and southern railways.

The Hallidie Machinery Company, L. C. Smith building, Seattle, Wash., has been appointed representative of the **Conveyors Corporation of America,** Chicago, formerly the American Steam Conveyor Corporation.

Edward S. Jenison, who for the past five years has been manager of the Philadelphia, Pa., office of the **Goulds Manufacturing Company,** Seneca Falls, N. Y., manufacturers of Goulds pumps, has been appointed acting general sales manager with headquarters at Seneca Falls, to succeed **W. E. Dickey,** who will retire on January 1.

The Vapor Car Heating Company, Inc., Chicago, Ill., will reopen its office in the Munsey building, Washington, D. C., on January 1, and will be represented by **Harry F. Lowman,** vice-president of the **Bradford Draft Gear Company,** New York. Mr. Lowman was formerly with the Vapor Car Heating Company, Inc.

P. S. Graver, general manager of the **Graver Corporation,** East Chicago, Ind., has been elected vice-president. **K. W. Bartlett,** formerly general manager of sales, has been promoted to succeed Mr. Graver and **William C. Gibson** has been appointed to succeed Mr. Bartlett.

Charles T. Topping has severed his connection with the Lakewood Engineering Company, Cleveland, Ohio, to engage in business as the **Charles T. Topping Machinery Company,** Pittsburgh, Pa., dealer in construction equipment. The company will act as district sales representatives of the **Austin Machinery Corporation,** Chicago.

Walter M. Taussig, treasurer and general manager of sales at New York of the **American Chain Company, Inc.,** Bridgeport, Conn., has been elected second vice-president; **Wilmot F. Wheeler,** production manager, is now also treasurer and **Arthur P. Van Schaick,** assistant general manager of sales, has been appointed general manager of sales.

H. L. Dean, formerly manager of the compressor and engine sales division of the Chicago Pneumatic Tool Company, New York, has resigned and **J. F. Huvane** has been appointed eastern manager of compressor and engine sales, with headquarters at 6 East Forty-fourth street, New York, and **G. C. Vanden Boom** has been appointed western manager of compressor and engine sales, with headquarters at 300 North Michigan boulevard, Chicago.

The Central Metal Products Corporation, with general offices at Canton, Ohio, is the successor of the **Zahner Metal Sash & Door Company,** Canton, and the **Empire Art Metal Company,** College Point, L. I., N. Y. **E. A. Williams, Jr.,** president of the Garford Motor Truck Company, at Lima, is president of the new company; **C. R. Jamison,** formerly works manager and general sales manager of the Berger Manufacturing Company, Canton, is vice-president and general manager; **H. R. Grable,** formerly secretary and treasurer of the Zahner Metal Sash & Door Company, Canton, is secretary and treasurer; **Harry G. Bow,** formerly president and general manager of the Canton Metal Products Company, Canton, is general sales manager, and **A. J. Connell,** formerly vice-president of the Empire Art Metal Company, College Point, is eastern manager.

Harry B. Stafford, for some three years manager in the Construction Division of the United States Army, has opened an office at 30 Church street, New York, as consulting industrial labor administrator. Prior to his entry into the army Mr. Stafford was general agent for the Southern Railway at Minneapolis. During his service in the Construction Division he was the officer in charge of both the Industrial Service and Labor Procurement Sections and it was his duty to not only help to procure labor for the some 4,000 building projects for which the Construction Division of the Army was responsible, but also to equalize wages and settle labor disputes. He is therefore well qualified for the business he has established, which is that of acting as an adviser to the executive heads of corporations which are not sufficiently large to maintain special departments of their own, for the purpose of establishing and maintaining harmony between employer and employee.

PASSENGER FARES IN EUROPE AND AMERICA.—Individuals, commercial organizations and associations in the middle west are being informed through letters and advertisements put out by the Illinois Central, that passenger transportation fares are less in the United States than those in other countries. For example, the fare between Jackson, Miss., and New Orleans, La., a distance of 183.1 miles, is $7.13, the fare for a lower berth $3.65 and the total $10.78. On the other hand, the fare between London and Manchester, England, 183.5 miles, is $11.07, the sleeping car fare $2.43, and the total $13.50. These figures include the recent increases and also the American war tax of 8 per cent. In addition to the service represented by the payment of these fares, the statement points out that the custom of handling ordinary baggage without charge is unknown abroad, while baggage rates are much greater than the excess rates in this country.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—This company has awarded contracts to the Roberts & Schaefer Company, Chicago, for the construction of three reinforced concrete, automatic, electric locomotive coaling and sanding plants of 300 tons capacity each, to be located at Guthrie, Cushing and Skedee, Okla. The approximate contract price was $165,000.

CHICAGO UNION STATION.—This company is preparing plans for the construction of a 16-story office building in connection with its station project at Chicago. The company is also accepting bids for structural steel to be used in building a viaduct at Van Buren street, Chicago, extending from Canal street to the Chicago river.

SOUTHERN PACIFIC.—This company is relaying 100 miles of main track between Lucin and Colin, Utah, and between Argenta and Harney, Nev., with new 90-lb. rail. The company is constructing additional facilities at Sparks, Nev., to accommodate the new icing plant of the Pacific Fruit Express. These improvements involve the purchase of 26 acres of additional right-of-way and the construction of about 2 miles of additional tracks. The yards at Carlin and at Wells, Nev., are being rearranged and extended, involving the construction of about 2¼ miles of tracks, and the shifting of 2,600 ft. of main tracks and 3,700 ft. of yard tracks. At Ogden, Utah, and is shifting 2,000 ft. of old tracks to provide a conand is changing other tracks to improve switching conditions, which involve the construction of approximately 1¼ miles of new tracks, the shifting of 2,000 ft. of old tracks, and extensions to the tracks of the Union Pacific. The Central Pacific is constructing 2,693 ft. of new tracks at Ogden, Utah, and is shifting 2,000 ft. of old tracks to provide a connection with the icing tracks of the Pacific Fruit Express.

THE TEXAS & PACIFIC has begun the job of moving its stationery department from Marshall, Tex., to Dallas.

ON TOP OF THE JOB.—Today, for the first time in five years, our railroads have not only caught up, but are actually out soliciting business. There are now no embargoes or restrictions of any kind on freight transportation. The railroads are able to handle expeditiously all business offered. In other words, they are on top of the job.—*Chicago (Ill.) Journal of Commerce.*

Photo by International.

President-Elect Harding at the Throttle of the Locomotive Which He Drove Twenty-Three Miles Across the Texas Prairies With His Wife an Interested Onlooker

Railway Financial News

ATLANTIC COAST LINE.—J. P. Morgan & Co. have sold an issue of $4,500,000, series D, 6½ per cent equipment trust certificates, due $300,000 yearly, from February 1, 1922, to February 1, 1936, inclusive. The certificates are issued in part payment for standard new railway equipment, consisting of 30 locomotives, 25 passenger cars, 400 coal cars, 500 box cars and 200 phosphate cars. The cost of this equipment is approximately $6,220,000, of which $1,720,000 is to be paid by the railroad company in cash, the cash payment thus being over 38 per cent of the amount of the certificates. The certificates were offered at prices to yield 7 per cent for the first five maturities, 6¾ per cent for the second five maturities, and 6⅝ per cent for the remaining maturities.

ATLANTIC COAST LINE.—The Interstate Commerce Commission has issued an order authorizing this company to enter into an equipment trust agreement for the purchase of $6,220,000 of equipment and to issue $4,500,000 of equipment trust certificates.

BALTIMORE & OHIO.—The Interstate Commerce Commission has approved a loan of $5,200,000 to the National Railway Service Corporation for account of the Baltimore & Ohio to enable that company to provide itself with freight-train equipment at a total estimated cost of $14,233,000. The railway company itself is required to finance about $9,000,000 to meet the loan of the government. The National Railway Service Corporation has been approved by the commission as an agency through which loans to carriers for equipment will be made, under special authority conferred upon the commission by the transportation act.

BOSTON & MAINE.—This company is asking holders of the $319,000 3½ per cent bonds of the Boston & Lowell and $290,000, 3½ per cent bonds of the Connecticut River, both maturing January 1, next, to accept new 10-year gold mortgage bonds of the Boston & Maine, bearing 7 per cent in settlement.

President Hustis sent the following statement to holders of the maturing bonds:

The Boston & Maine offers in settlement of these maturities its 10-year gold mortgage bonds bearing 7 per cent interest, payable semi-annually. These bonds will be secured by first mortgage on all the property of the consolidated Boston & Maine Railroad, except that there remain three issues secured by prior liens on small parts of our property known as the Portsmouth, Great Falls & Conway, the Worcester, Nashua & Rochester, and the Troy & Boston railroads. On account of the present financial conditions these bonds cannot be sold on the market at satisfactory prices.

At the present time, pending the completion of an accounting with the United States Government for the period of federal control and the subsequent guarantee period, the working capital of the Boston & Maine, in common with that of many other roads, is largely in the hands of the Government.

Aside from any claims which might be of a controversial nature there is unquestionably due a very substantial sum. In fact, several weeks ago the Interstate Commerce Commission certified to the Secretary of the Treasury an immediate payment on account of $2,500,000, but payment was withheld on account of a technical ruling of the Comptroller of the Treasury. The position of the Treasury Department is now being contested in the courts, but pending the outcome of these proceedings and the result of other negotiations now being conducted with the Government, cash is not available which can be supplied to the payment of these bonds.

CENTRAL OF NEW JERSEY.—The special semi-annual dividend of 2 per cent is not being paid at the present time. A circular of the company states that for many years a dividend of 2 per cent has been declared payable in December out of dividends of 13 per cent per annum received by it on its $8,489,400 stock in the Lehigh & Wilkes-Barre Coal Company. The coal company has received its usual dividend, but the railroad company is enjoined from receiving its part of this dividend by the decree of the federal court in the so-called Reading trust suit. The railroad company confidently expects ultimately to receive the amount of this dividend from the coal company and to distribute it to its stockholders, but is prevented by the injunction from doing so now.

CHICAGO & EASTERN ILLINOIS.—The reorganization plan is given on another page of this issue.

GRAND RAPIDS & INDIANA.—The lease of this company's railway and properties to the Pennsylvania Railroad for a long term of years, effective January 1, 1921, was approved by the stockholders at a special meeting.

ILLINOIS CENTRAL.—This company has applied to the Interstate Commerce Commission for authority to issue $3,245,000 of its 4 per cent refunding mortgage bonds originally issued in 1913, to be pledged for the purpose of obtaining loans for the current necessities of the company; also, $3,708,000 of Illinois Central and Chicago, St. Louis & New Orleans joint first and refunding mortgage bonds to reimburse the treasury for advances made for additions and betterments to the Chicago, St. Louis & New Orleans and the Canton, Aberdeen & Nashville. These bonds are also to be pledged for the purpose of obtaining loans. The first pledge will be to meet the financial necessities of the company arising from its failure to receive the government guaranty.

NEW YORK CENTRAL.—The Interstate Commerce Commission has approved a loan of $26,775,000, chiefly to the Michigan Central, the Cleveland, Cincinnati, Chicago & St. Louis, the Cincinnati Northern, the Toledo & Ohio Central, the Zanesville & Western, the Kanawha & Michigan, and the Lake Erie & Western, which are subsidiaries of the New York Central, and the New York Central itself, to aid the carriers named in providing themselves with new equipment and additions and betterments to existing equipment and to way and structures, at a total estimated cost of $56,625,000. The carriers themselves are required to finance about $30,000,000 to meet the loan of the government.

The total proposed expenditure of $56,625,000 includes $39,800,000 for new equipment, of which $29,650,000 is to be financed by the company and $9,950,000 from the loan; also, $5,312,000 of additions and betterments to existing equipment to be financed from the loan, and $11,313,000 of additions and betterments to ways and structures to be financed by the loan. The company and its subsidiaries have themselves financed by the sale of securities since the termination of federal control $63,625,000 for refunding and other necessary corporate purposes.

NEW YORK, NEW HAVEN & HARTFORD.—The payment of $2,500,000 to this railroad on December 28 as a compromise settlement in the so-called restitution suit against former directors was approved by Judge Hough in the United States District Court. The court fixed the counsel fees of the plaintiffs at one-third of the settlement, or $833,333.33.

The suit was brought by Edwin Adams, Julius C. Morse, George C. Fisk (deceased), James F. Ray and Mary M. Clark against William Rockefeller, Charles M. Pratt, Lewis Cass Ledyard and J. Pierpont Morgan, Herbert L. Satterlee, William P. Hamilton and Lewis Cass Ledyard as executors under the will of J. P. Morgan (deceased) and Florence A. Twombly as executrix under the will of Hamilton McK. Twombly, and the New York, New Haven & Hartford Railroad. The purpose was to recover money lost by alleged unlawful and ultra vires acts of directors in the years 1890-1914.

PENNSYLVANIA RAILROAD COMPANY.—See Grand Rapids & Indiana; also Pittsburgh, Cincinnati, Chicago & St. Louis.

PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.—At the stockholders' meeting held in Pittsburgh on December 29 to vote on the lease of this company's railroad and property to the Pennsylvania Railroad Company, 828,778 shares, which at par aggregate $82,877,800 out of a total of $84,518,322 of capital stock, or over 98 per cent, voted in favor of the lease, and only 2,000 shares, par value $200,000, in opposition to it.

TOLEDO TERMINAL RAILROAD.—This company has applied to the Interstate Commerce Commission for authority to issue $72,000 of 6 per cent promissory notes as part payment for two freight locomotives at $48,250 each, purchased from the American Locomotive Company.

WILMINGTON, BRUNSWICK & SOUTHERN.—The Interstate Commerce Commission has approved a loan of $90,000 to this company to aid the carrier in meeting its maturing indebtedness and providing itself with additions and betterments to way and structures at a total estimated cost of $125,000. The carrier itself is required to finance about $35,000 to meet the loan of the government.

Railway Officers

Executive

R. C. Vaughan, whose appointment as vice-president of the Canadian National was announced in the *Railway Age* of December 17 (page 1095), was born December 1, 1883, and was educated in the public and high schools. He entered railway service in 1898 with the Canadian Pacific and remained with that company for four years. He then went to the Grand Trunk for a brief period and, in 1903, entered the employ of the Canadian Northern in the office of the third vice-president. In 1910 he was appointed assistant to the third vice-president and, in 1918, assistant to the president of the Canadian National. He served in that capacity until his recent appointment as vice-president.

Financial, Legal and Accounting

H. T. Evans, auditor of the Chicago, Indianapolis & Louisville, has been promoted to comptroller, effective December 10.

Operating

W. L. White has been appointed general manager of the Yosemite Valley, effective January 1.

H. H. Vance, whose appointment as general superintendent of the Southern was announced in the *Railway Age* of December 17 (page 1095), was born in Alabama, and, after graduating from high school in 1887, entered the employ of the Alabama Great Southern as a brakeman. Two years later he was promoted to freight conductor and, in 1895, to passenger conductor. He was appointed trainmaster with headquarters at Birmingham in 1903. In 1912 Mr. Vance went with the Southern as superintendent of terminals at Birmingham, Ala. In 1915 he was appointed division superintendent with headquarters at Birmingham and served in that capacity until his recent promotion.

H. H. Vance

J. J. McCullough, whose appointment as superintendent of the Puget Sound division of the Northern Pacific, with headquarters at Seattle, Wash., was announced in the *Railway Age* of December 3 (page 1001), was born on June 17, 1871, at DeSoto, Ill., and entered railway service in 1887, as a freight brakeman on the Illinois Central. In 1888, he became a freight brakeman on the Minneapolis & St. Louis, and was shortly promoted to conductor, running out of Minneapolis, Minn. He left the service of the Minneapolis & St. Louis in 1894 to become a switchman on the Great Northern, at Superior, Wis., being employed by that road as switchman and as general yardmaster until 1900, when he was appointed general yardmaster on the Erie, with headquarters at Jersey City, N. J. During his 6 years of service with the Erie, Mr. McCullough was promoted to trainmaster, but resigned in 1906 to become trainmaster on the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn. He was appointed trainmaster on the Northern Pacific in 1907, and was soon promoted to superintendent, a position which he held until January 10, 1918, when he was given active charge of terminal operation at Minneapolis, under the United States Railroad Administration. He was retained, on March 1, 1920, as joint terminal superintendent of the Northern Pacific, the Great Northern, the Chicago, Milwaukee & St. Paul, and the Union Pacific, being employed in closing up federal operation until December 1, when he returned to his former position as superintendent on the Northern Pacific.

W. J. Sullivan, chairman of the Committee on Car Service at Birmingham, Ala., retired from that position on December 15 upon dissolution of the committee and has been appointed traffic manager for the Black Diamond Coal Mining Co., Birmingham. Mr. Sullivan was born at Walton, Kentucky, January 23, 1883, and entered railway service in 1896 as a telegraph operator on the Cincinnati, New Orleans & Texas Pacific. He subsequently served the same road as agent, despatcher and chief despatcher. In June, 1908, he went to the St. Louis-San Francisco as chief despatcher. Later he was promoted to assistant superintendent and, thereafter, to inspector of passenger train service. On August 1, 1918, Mr. Sullivan left the Frisco to become traveling representative in the Southern region for the United States Railroad Administration. When the roads were returned to their owners he continued to serve in the same capacity for the Car Service Division of the American Railway Association. On August 15 he went to Birmingham as chairman of the Committee on Car Service.

W. J. Sullivan

J. H. Redding, whose appointment as superintendent of the Wheeling Terminal division of the Pennsylvania was announced in the *Railway Age* of December 10 (page 1046), was born November 26, 1877, at Philadelphia. He entered the employ of the Pennsylvania in the office of the engineer maintenance of way in 1897 and remained in that position until April, 1905, when he became transitman, reporting to the principal assistant engineer, Eastern Pennsylvania division. In June of the same year he was appointed assistant supervisor of the Philadelphia division, and the following year, was transferred in the same capacity to the Maryland division. In 1907 Mr. Redding was promoted to supervisor on the Sunbury division and during the next ten years served in that capacity on four other divisions in turn. In 1917 he became division engineer on the West Jersey and Seashore division and subsequently served in the same office on the Middle and New York divisions. At the time of his promotion to superintendent at Wheeling, Mr. Redding was assistant superintendent of the Pittsburgh division, having been appointed to that position on March 1, last.

J. H. Redding

Traffic

C. H. McNie has been appointed general live stock agent of the Chicago & North Western, with headquarters at Chicago, effective January 1, succeeding D. D. Cutler, who has retired.

Walter Gray, traveling agent on the Kansas City, Mexico & Orient, with headquarters at Kansas City, Mo., has been promoted to general agent, with headquarters at El Paso, Tex., succeeding T. K. Partridge, who has resigned to accept service with the Southwestern Portland Cement Company at Los Angeles, Cal.

K. B. Hannigan, whose appointment as general freight agent of the Southern with headquarters at St. Louis was announced in the *Railway Age* of December 24 (page 1138), was born August 18, 1869, at St. Louis, Mo. He was educated at St. Malachy's College of that city and entered railway service in 1886 as a messenger for the Missouri Pacific. He was later promoted to claim clerk and served in that capacity on the Missouri Pacific, the St. Louis Southwestern and several other roads in and around St. Louis. In 1901 he went to the Southern as a commercial agent and was promoted in 1915 to assistant general freight agent, in which position he was serving when his latest promotion was announced.

W. F. Griffitts, whose appointment as passenger traffic manager of the Delaware, Lackawanna & Western was announced in the *Railway Age* of December 24 (page 1138), was born on March 1, 1871, at Philadelphia, Pa. He was educated in the public schools and entered railway service in 1884 as a clerk for the Chicago, Burlington & Quincy at Omaha, Neb. Subsequently he held various clerical positions with that company at St. Joseph, Mo., and St. Louis. In 1897 he became chief clerk in the passenger department of the Kansas City, Pittsburg & Gulf (now a part of the Kansas City Southern) and remained in that position until 1899, when he went to New York as chief rate clerk for the Delaware, Lackawanna & Western. In 1901 he was promoted to chief clerk of the passenger department and, in 1910, to assistant general passenger agent. Mr. Griffitts was general passenger agent at the time of his recent promotion, having been appointed to that position in 1914.

Mechanical

C. H. Temple, superintendent of motive power and car department of the Canadian Pacific, West Lines, has been appointed chief of motive power and rolling stock, with headquarters at Montreal, effective January 1.

P. O. Wood, superintendent of the St. Louis-San Francisco with headquarters at Memphis, Tenn., has been appointed assistant superintendent of motive power with headquarters at Springfield, Mo. Mr. Wood was born at Memphis, Tenn., in 1877. He entered the service of the Kansas City, Memphis & Birmingham (now a part of the Frisco) in 1891 as a machinist's apprentice in the Memphis shops. After completing his apprenticeship he served as a machinist and air brake repairman until 1904, when he became a locomotive fireman. In 1907 he was promoted to engineman and, in 1913, to assistant superintendent of locomotive performance. In 1916 another promotion made him assistant general superintendent of motive power. In 1917 he became division superintendent at Memphis and remained in that position until his recent appointment.

Engineering, Maintenance of Way and Signaling

L. P. O. Exley, office engineer of the Mobile & Ohio with headquarters at St. Louis, Mo., has been appointed office engineer of the Gulf, Mobile & Northern, with headquarters at Mobile, Ala.

Charles Scott, supervisor of bridges and buildings on the Buffalo, Rochester & Pittsburgh with headquarters at East Salamanca, N. Y., has been promoted to acting engineer of masonry with the same headquarters, succeeding George H. Stewart. **W. E. Maley** has been promoted to acting supervisor of bridges and buildings to succeed Mr. Scott.

E. J. Henriques has been appointed office engineer of the Mobile & Ohio with headquarters at St. Louis, Mo. **J. V. Johnston,** assistant to bridge engineer with headquarters at St. Louis, has been promoted to division engineer with headquarters at Murphysboro, Ill., succeeding S. F. Ryan. **C. V. Irvine,** division engineer on the Columbus & Greenville, has been appointed assistant engineer of the Mobile & Ohio with headquarters at St. Louis.

William H. Penfield, whose promotion to engineer maintenance of way of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, was announced in the *Railway Age* of December 10 (page 1048), was born on January 12, 1874, at Foxbury, Pa., and entered railroad service in 1894, with the Buffalo, Rochester & Pittsburgh. During the next five years he served on this road as chainman, rodman, leveler and transitman on location surveys, and as instrumentman on construction and maintenance work, and later as office draftsman. On August 1, 1899, he entered the service of the Chicago, Milwaukee & St. Paul, as a resident engineer on construction, and was made successively assistant engineer on maintenance, and locating engineer, which positions he held until March 1, 1903, when he was appointed locating engineer on the Western Pacific, being employed on location work through Beckwith Pass in the Sierra Nevada mountains and the upper Feather River country in California. On December 15, 1905, Mr. Penfield returned to the Chicago, Milwaukee & St. Paul as engineer of construction, with headquarters at Butte, Mont., with jurisdiction over the location and construction of the main line between Butte and Lombard, Mont. In June, 1911, he was promoted to assistant chief engineer, with headquarters at Chicago. At the time of his recent promotion, Mr. Penfield was engineer of track maintenance, a position to which he had been appointed in February, 1913.

W. H. Penfield

Obituary

Junius L. Burgess, paymaster on the Chicago & North Western, with headquarters at Chicago, died at Oak Park, Ill., on December 23.

David L. Bush, assistant to the vice-president of the Chicago, Milwaukee & St. Paul and formerly vice-president in charge of operation, died on December 23.

William M. Lampton, general freight agent of the Denver & Rio Grande, with headquarters at Denver, Col., died at Denver on December 27. Mr. Lampton was born on September 2, 1863, and was educated at Westminster College, graduating in 1881. He entered railway service as a traveling auditor with the Texas & Pacific in 1882. From 1885 to 1892, he was engaged in mercantile business at Fort Worth, Tex. In October of the latter year, he re-entered railway service with the Denver & Rio Grande as a claim clerk, he was made chief clerk in July of that year and was promoted to general agent in the freight department in February, 1898. He became assistant general freight agent in November, 1899, and in May, 1914, was promoted to the position he held at the time of his death.

PENNSYLVANIA STOCKHOLDERS on December 11 reached the new high record number of 131,115.

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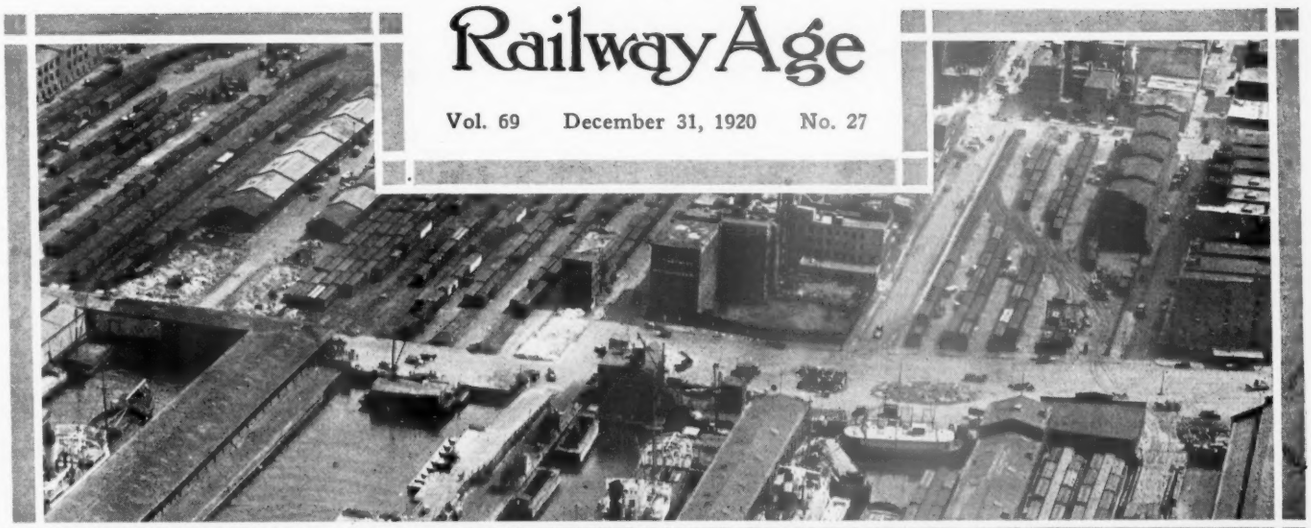

Railway Docks at Hoboken, N. J. Photo by Keystone View Co.

Contents

Pacific Fruit Express Refrigerator Cars ..... Page 1145

A Description of the 4,000 Recently Placed in Service. Design Characterized by Unbroken Insulation Around Sides and Ends and by Continuous Layer of Cork on Floor.

The Transportation Problem in the Coal Industry 1149

A Paper Read Before the American Economic Association at Atlantic City, N. J., on December 28 by A. G. Gutheim, Manager of the Public Relations Section, Car Service Division, A. R. A.

Labor Turnover—Not a Disease, But a Symptom 1157

J. C. Clark, Assistant to General Manager, Oregon Short Line, Points Out That Locating and Removing the Causes Will Greatly Increase the Efficiency of the Railroads.

EDITORIALS

Keep the Power Loaded 1139
The Supervisor Should Be Out On the Line 1139
National Industrial Traffic League 1139
Improved Versus Unimproved Locomotives 1139
Passenger Service and Public Opinion 1140
The Express Consolidation 1140
Conserving Cash and Lumber 1140
One of the Sore Spots 1140
How Can Collisions Be Prevented? 1141
Is There an "Irrepressible Conflict?" 1141
Are Car Conditions Improving? 1142

NEW BOOKS 1143

LETTERS TO THE EDITOR

Visual Signals vs. Automatic Stops; A. H. McKeen 1144
The Collision Scandal; James B. Latimer 1144

GENERAL ARTICLES

Pacific Fruit Express Refrigerator Cars 1145
The Transportation Problem in the Coal Industry; A. G. Gutheim 1149
The New Era of Railroad Transportation in America; Lewis J. Spence 1153

GENERAL ARTICLES—Continued

Express Contract Approved 1154
October Freight Traffic Statistics 1156
Labor Turnover—Not a Disease But a Symptom; J. C. Clark 1157
Review of the Railroad Situation for the Year; T. De Witt Cuyler 1159
Living Conditions of Trainmen Who Lie Over at Railway Terminals 1160
Observations on a Transcontinental Journey; William S. Wollner 1161
A Means of Protecting Grade Crossings 1162
Progress on Alaska Railroad 1163
Annual Report of the Chief of the Bureau of Safety 1165
Chicago & Eastern Illinois Reorganization Plan 1167
Chairman Clark Discusses Freight Rates 1168
Rail Statistics Show Improvement for 1914 Rolling 1168
Less-Car-Load Shippers Co-operate in Car Loading 1169
The Application of Engineering to Transportation; J. A. Peabody 1170
Operating Statistics for October 1172
A New Rail Joint 1173
North Pole Sanitary Drinking Fountain 1173

GENERAL NEWS DEPARTMENT 1175

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ALPHABETICAL INDEX TO ADVERTISEMENTS

A

Air Reduction Co. 89
American Arch Co., Inc. 54
American Blower Co. 32
American Brake Shoe & Fdy. Co. 91
American Bridge Co. 102
American Chain Co., Inc. 2
American Locomotive Co. 63
American Malleable Castings Association 39
Am. Mason Safety Tread Co. . 95
American Sheet & Tin Plate Co. 93
American Steel Foundries 29
American Steel & Wire Co. ... 47
Arnold Co., The 88
Ashton Valve Co., The 95
Austin Co. 20, 21

B

Babcock & Wilcox Co., The ... 93
Baldwin Locomotive Works 65
Barco Mfg. Co. 64
Basford Co., G. M. 51
Birmingham Rail & Locomotive Co. 80
Blaw Knox Co. 99
Bronze Metal Co. 94
Brooks-Scanlon Co. 95
Brown Hoisting Machinery Co., The 98
Browning Co., The 99
Buffalo Forge Co. 94
Burden Iron Co. 94
Bush, Roberts & Schaefer 83

C

Cambria Steel Co. 13
Canton Culvert & Silo Co. 78
Cast Iron Pipe Publicity Bureau 73
Chase & Co., L. C. 92
Chicago-Cleveland Car Roofing Co. 94
Chicago Ry. Equipment Co. ... 93
Clark Car Co. 17
Classified Advertisements 80
Cleveland Frog & Crossing Co. 91
Columbia Nut & Bolt Co. 95
Crane Co. 94
Crosby Steam Gage & Valve Co. 89

D

Damascus Brake Beam Co., The 95
Damascus Bronze Co. 95
Day & Zimmerman 88
Dearborn Chemical Co. 79
De Mayo Engineering Corp. ... 25
Detroit Graphite Co. 28
DeVilbiss Mfg. Co., The 94
Dickinson, Inc., Paul 95
Directory of Advertisers, Classified 8, 10, 14, 16, 18
Directory of Engineers 88
Dixon Crucible Co., Joseph 88
Duff Mfg. Co. 31
Duner Co. 95

E

Edgewater Steel Co. 77
Edison Storage Battery Co. 11
Elvin Mechanical Stoker Co... 61
Elwell-Parker Electric Co., The 94

F

Falls Hollow Staybolt Co. 91
Flannery Bolt Co. 69
Fort Pitt Malleable Iron Co... 94
Fort Pitt Spring & Mfg. Co.. 95
Fowler, Chas. Evans 88
Frank, M. K. 80
Franklin Railway Supply Co., 52, 53, 55
Fuller-Lehigh Co. 78

G

Galena-Signal Oil Co. 72
General American Tank Car Co. 38
Get Together Department, 80, 81, 82, 83, 84, 85, 86, 87
Gibson Pribble Co. 78
Giessel, Henry, Co. 93
Goodrich Rubber, B. F., Co. ... 33
Gold Car Htg & Lighting Co... 91
Gould Coupler Co. 44
Graver Corporation 90
Greenville Steel Car Co. 92
Gulick-Henderson Co. 88

H

Haskell & Barker Car Co., Inc. 43
Hayward Co., The 99
Heywood Bros. & Wakefield Co. 91
Hunt-Spiller Mfg. Corp. 62
Hunt & Co., Robert W. 88
Hutchins Car Roofing Co. 50
Hyman-Michaels Co. 80

I

Independent Pneumatic Tool Co. 90
Individual Drinking Cup Co., Inc. 94
Industrial Works 97
Ingersoll-Rand Co. 40, 47
Interstate Iron & Steel Co. ... 95

J

Jennison-Wright Co., The 30
Johns-Manville Co. 45

K

Keith Ry. Equip. Co. 88
Keller Pneumatic Tool Co. 78
Kerite Insulated Wire & Cable Co. 44

L

Lackawanna Steel Co. 22, 23
Lehon Co., The 95
Lillie Co., Dexter P. 94
Lima Locomotive Works, Inc.. 58
Link Belt Co. 99
Locomotive Feed Water Heater Co. 56
Locomotive Stoker Co. 70
Locomotive Superheater Co. ... 59
Lukens Steel Co. 66

M

Magnus Co., Inc. 47
Males Co. 80
Manganese Steel Rail Co. 94
Manning, Maxwell & Moore, Inc. 9
McConway & Torley Co., The. 47
McMyler Interstate Co. 96
Midvale Steel & Ordnance Co. 13
Miller Train Control Corp. ... 19
Miner, W. H. 3
Mississippi Wire Glass Co. 94
Monroe Calculating Machine Co. 81
More-Jones Brass & Metal Co. 90
Morse Bros. Machy. & Supply. 81
Mount Vernon Car Mfg. Co.. 46
Mudge & Co. 92
Murphy Varnish Co. 35

N

National Malleable Castings Co. 41
Nat'l Ry. Appliance Co. 90
Nichols & Bros., Geo. P. 95

O

Ohio Locomotive Crane Co. ... 44
Okonite Co., The 9
Orton & Steinbrenner 99

P

Parkesburg Iron Co., The 60
Paxton Mitchell Co. 76
Pilliod Co., The 67
Pittsburgh-Des Moines Steel Co. 95
Pittsburgh Spring & Steel Co.. 94
Pittsburgh Testing Laboratory. 88
Pollak Steel Co., The 4
Power Specialty Co. 92
Pratt & Whitney Co. 46
Pressed Steel Car Co. 42
Pyle National Co. 78

Q

Q & C Co. 75

R

Rail Joint Co. 90
Railroad Supply Co., The. 95
Railway Devices Co., The. ... 91
Ry. Materials Co. 93
Railway Steel Spring Co. 36
Railway & Industrial Engrs... 88
Ralston Steel Car Co. 42
Ramapo Iron Works 94
Refinite Co., The 90
Rivet Cutting Gun Co. 34
Robinson & Co., Dwight P. ... 88
Rogatchoff Co. 92
Rogers Co., H. A. 92
Rome Iron Mills, Inc. 57
Ryerson & Son, Joseph T. 15

S

Safety Car Heating & Lighting Co., The 92
Schaefer Equipment Co. 93
Scullin Steel Co. 37
Sellers & Co., Inc., Wm. 76
Severance, S., Co. 90
Sherman Service, Inc. 27
Smith & Co., C. E. 88
Southern Cypress Mfrs. Assn.. 45
Southern Iron & Equipment Co. 81
Standard Car Truck Co. 93
Standard Coupler Co. 95
Standard Forgings Co. 48
Standard Optical Co. 26
Standard Ry. Equipment Co... 41b
Standard Steel Works Co. 49
Stone, Franklin, Co. 89
Stone & Webster 88
Stucki Co., A. 94
Sunbeam Elec. & Mfg. Co. 77
Symington Co., T. H., The. ... 7

T

Texas Co., The 74
Tokheim Oil Tank & Pump Co. 79
Track Specialties Co. 80
Tyler Tube & Pipe Co. 90

U

Union Draft Gear Co. 46
Union Metal Prod. Co. 1
Union Fuel Co. 89
Union Spring & Mfg. Co. 92
U. S. Cast Iron Pipe & Fdy. Co. 99
U. S. Light & Heat Corp. 93
U. S. Metallic Packing Co., The 68
U. S. Rubber Co. 102

V

Vapor Car Heating Co., Inc.. 92

W

Walworth Mfg. Co. 95
War Dept. 82, 83, 84, 85, 86, 87
Watson Engineering Co. 88
Western Ry. Equipment Co... 91
Westinghouse Air Brake Co... 71
Wharton, Jr., & Co., Inc., Wm. 91
Whitcomb, Geo. D. 89
White Eng. Corp., J. G. 88
Whiting Corp. 24
Wilson, E. H., Co. 80
Wine Ry. Appliance Co., The.. 94
Woods & Co., Edwin S. 44

Y

Youngstown Steel Car Co. 46

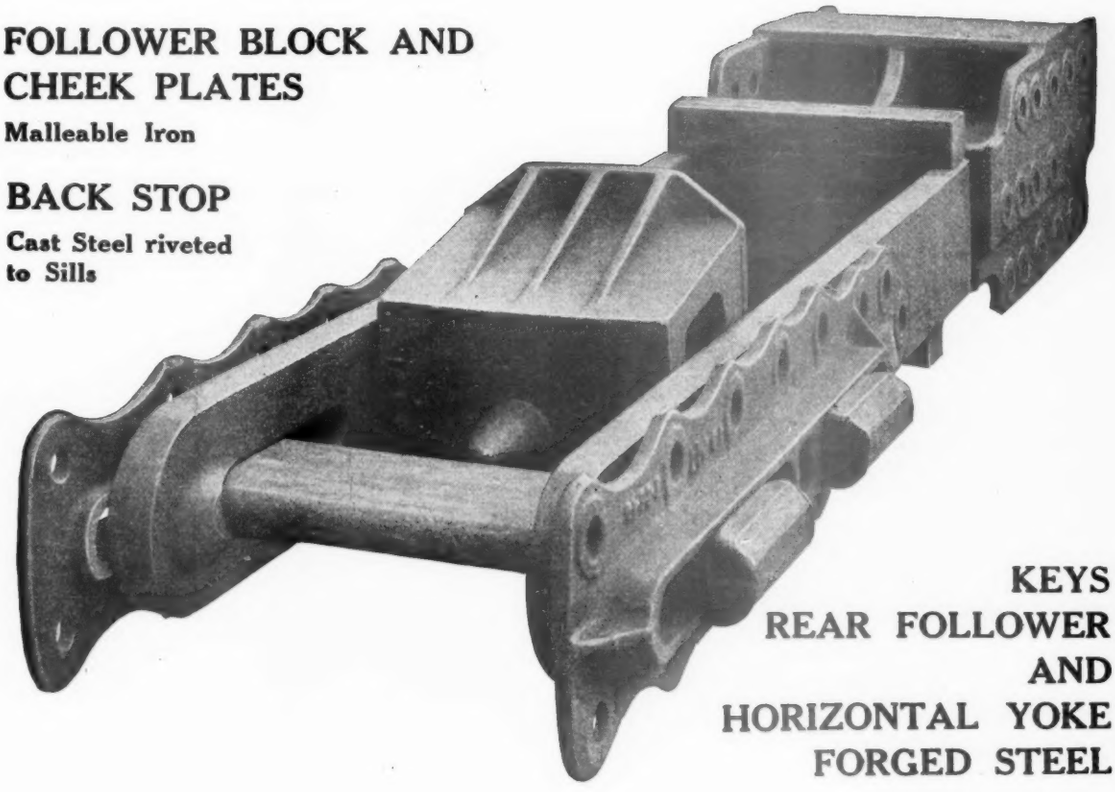
SYMINGTON

FARLOW

DRAFT ATTACHMENTS

FOLLOWER BLOCK AND CHEEK PLATES
Malleable Iron

BACK STOP
Cast Steel riveted to Sills



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DIRECTORY OF ADVERTISERS, CLASSIFIED—ALPHABETICAL INDEX, PAGE 6

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Air Reduction Co., Inc.

AERIAL TRAMWAYS.
American Steel & Wire Co.

AIR HAMMERS.
Chicago Pneumatic Tool Co.
Keller Pneumatic Tool Co.

AIR INJECTORS.
Chicago Pneumatic Tool Co.
Keller Pneumatic Tool Co.

ANGLE BARS.
Cambria Steel Co.
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Ryerson & Son, Joseph T.

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APPARATUS, BRAZING, WELDING AND CUTTING HEAT TREATMENT.
Air Reduction Co., Inc.

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American Arch Co.

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National Tube Co.

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National Ry. Appliance Co.

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General Electric Co.
P. & M. Co., The.
Union Switch & Signal Co.

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Carnegie Steel Co.
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Lima Locomotive Works, Inc.
Pollak Steel Co.
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Damascus Bronze Co.
Ryerson Co., Joseph T.

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BARGES.
American Bridge Co.

BARGES AND HULLS.
Pittsburgh-Des Moines Steel Co.

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Cambria Steel Co.
Carnegie Steel Co.

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Ryerson & Son, Joseph T.

BARS, FOR REINFORCED CONCRETE.
Carnegie Steel Co.
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Pollak Steel Co.

BARS, IRON AND STEEL.
Cambria Steel Co.
Carnegie Steel Co.
Falls Hollow Staybolt Co.
Lackawanna Steel Co.
Pollak Steel Co
Ryerson & Son, Jos. T.

BARS, STEEL.
Carnegie Steel Co.
Ryerson & Son, Joseph T.

BATTERIES, ELECTRIC.
Edison Storage Battery Co.
Railroad Supply Co.
U. S. Light & Heat Corp.

BATTERIES, SIGNAL.
U. S. Light & Heat Corp.

BATTERIES, STORAGE.
Edison Storage Battery Co.
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BATTERY CHUTES AND VAULTS.
Railroad Supply Co.
Union Switch & Signal Co.

BEARING METAL.
Ryerson & Son, Joseph T.

BEARINGS, CENTER.
Miner, W. H.
Symington Co., T. H.
Woods & Co., Edwin S.

BEARINGS, JOURNAL.
A. Allan & Son.
Ajax Metal Co.
Bronze Metal Co.
Damascus Bronze Co.
Haskell & Barker Car Co.
Magnus Co.

BEARINGS, SIDE.
American Steel Foundries.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
Stucki Co., A.
Woods & Co., Edwin S.

BEARINGS, SIDE (ROLLER) (FRICTIONLESS).
Chicago Ry. Equipment Co.
Miner, W. H.
Wine Railway Appliance Co., The.
Woods & Co., Edwin S.

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Railway Devices Co.
U. S. Metallic Packing Co.
Western Railway Equipment Co.

BELTING.
B. F. Goodrich Rubber Co.

BELLS, LOCOMOTIVE.
American Locomotive Co.

BENDING MACHINES.
Ryerson & Son, Joseph T.

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Sellers & Co., Inc., Wm

BENDING AND STRAIGHTENING MACHINES.
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Sellers & Co., Inc., Wm.

BOILER TUBES.
Ryerson & Son, Joseph T.

BOILERS.
Babcock & Wilcox Co., The

BOILERS, LOCOMOTIVE.
American Locomotive Co.
Baldwin Locomotive Works, The.
Lima Locomotive Works.

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American Steel Foundries
Buckeye Steel Castings Co.
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Ryerson & Son, Joseph T.

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Ryerson & Son, Joseph T.

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Sellers & Co., Inc., Wm.

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Ryerson & Son, Joseph T.

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American Steel & Wire Co.
Brown Hoisting Machinery Co.

CABOOSE JACKETS, CAST-IRON.
Dickinson, Inc., Paul.

CAR DOORS, FREIGHT.
Haskell & Barker Car Co., Inc.
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Haskell & Barker Car Co., Inc.
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Stone Franklin Co.
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CAR LIGHTING GENERATORS.
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CAR LIGHTING SYSTEMS, BATTERIES, ETC.
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Haskell & Barker Car Co., Inc.
Mt. Vernon Car Mfg. Co.
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Haskell & Barker Car Co., Inc.
Mt. Vernon Car Mfg. Co.

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Ingersoll Rand Co.

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Cambria Steel Co.
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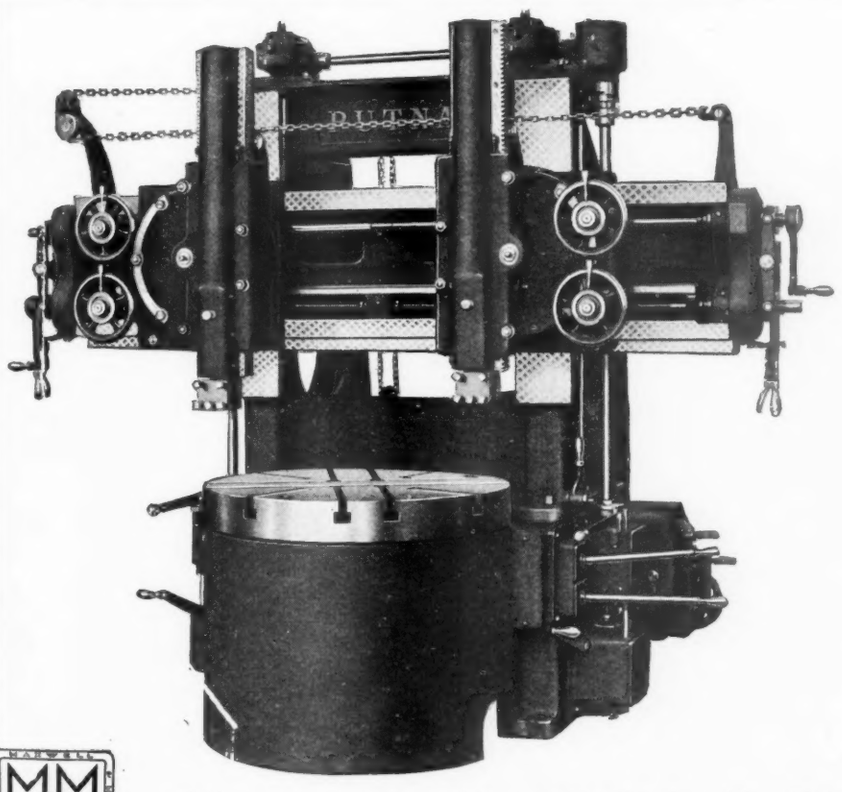

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Lakewood Engineering Co., The.

CARS, INDUSTRIAL.
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American Car & Fdry. Co.
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CARS, REBUILT.
Greenville Steel Car Co.
Keith Ry. Equipment Co.
Mt. Vernon Car Mfg. Co.

CARS, REBUILT (STEEL).
Greenville Steel Car Co.
Haskell & Barker Car Co., Inc.
Keith Ry. Equipment Co.
Mt. Vernon Car Mfg. Co.

CARS, SECOND-HAND.
Keith Ry. Equipment Co.
Southern Iron & Equipment Co.
Zelnicker Supply Co., Walter A.

CARS, SELF-PROPELLED PASSENGER.
General Electric Co.

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American Malleable Castings Assn.
Buckeye Steel Castings Co.
Fort Pitt Malleable Iron Co.
Link-Belt Co.
National Malleable Castings Co.
P. & M. Co., The

CASTINGS, STEEL.
American Locomotive Co.
American Steel Foundries
Duquesne Steel Fdry. Co.
Edgewater Steel Co.
Gould Coupler Co.
Haskell & Barker Car Co.
Link-Belt Co.
Midvale Steel & Ordnance Co.
Standard Steel Works
Union Steel Castings Co.
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Miner, W. H.

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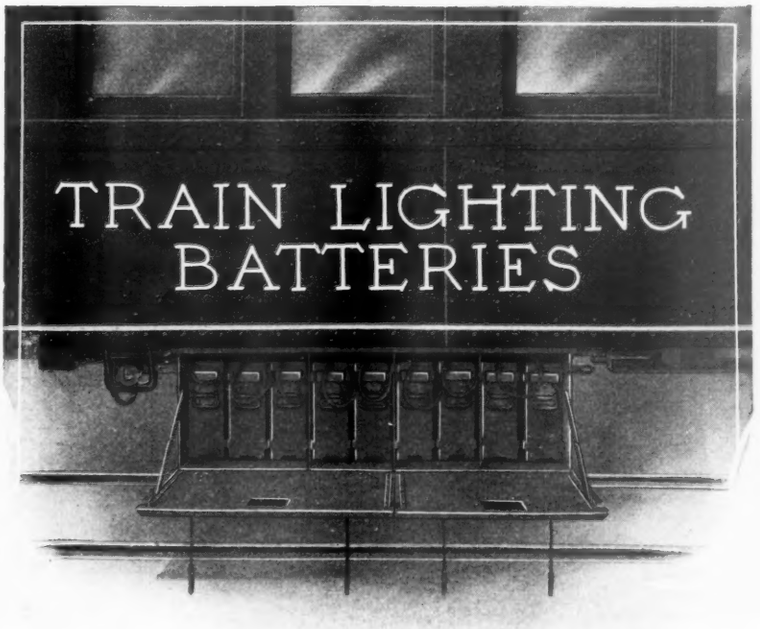

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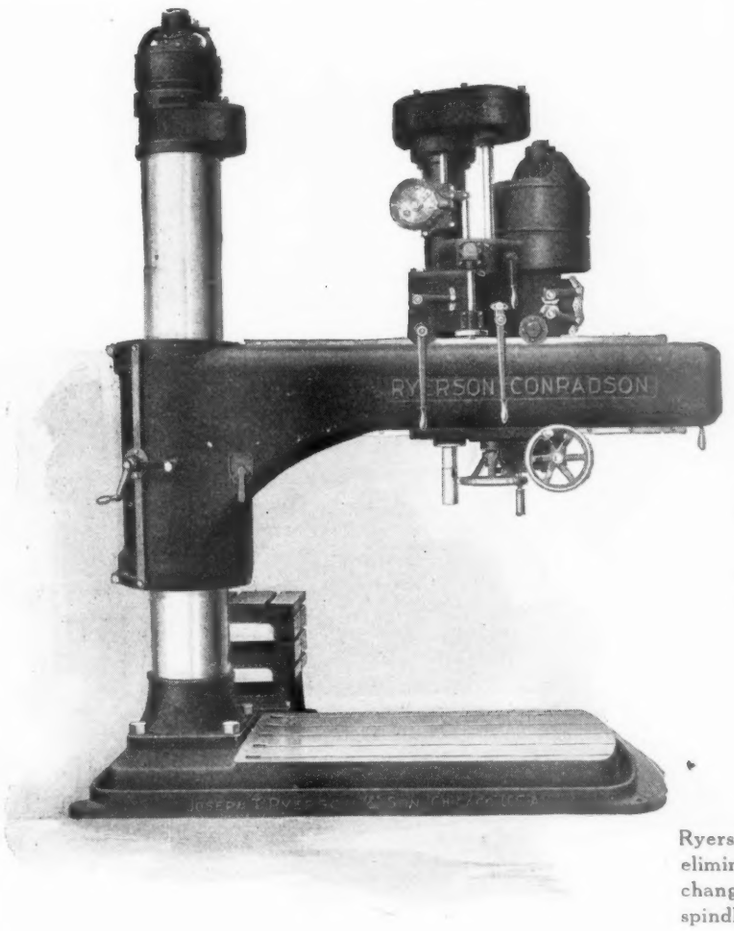

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Q. & C. Co., The.

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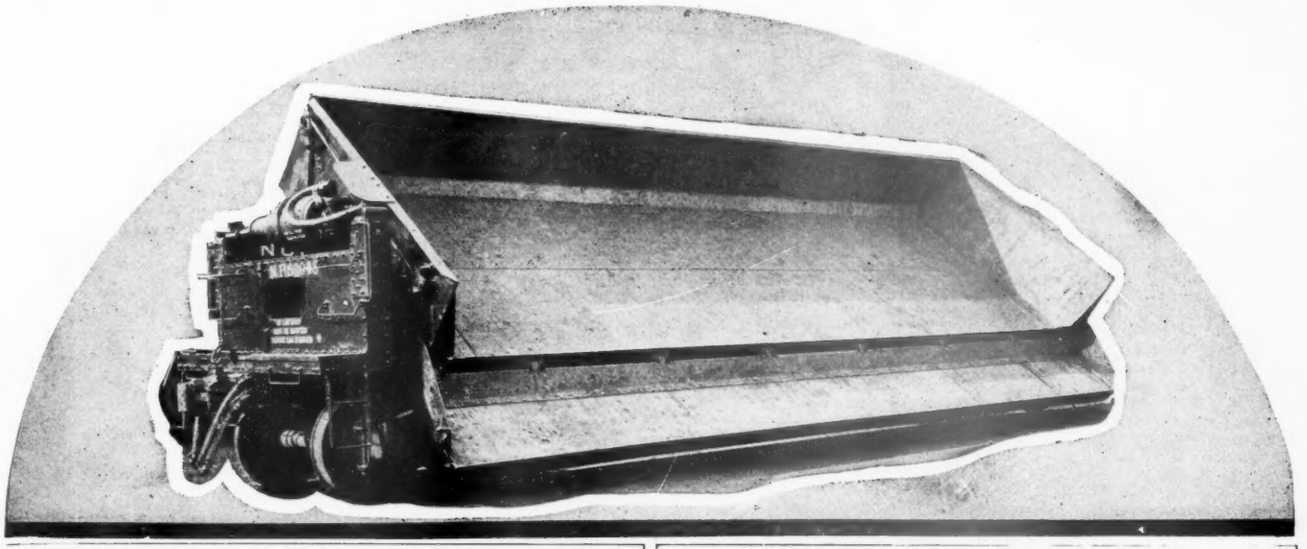

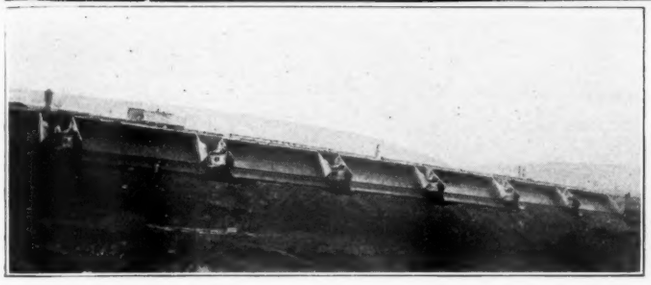

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Graver Corporation.

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Lackawanna Steel Co.
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Carnegie Steel Co.

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Ryerson Co., Joseph T.

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Whiting Corp.

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Pratt & Lambert

VENTILATORS, CAR.
Mudge & Co.
Vapor Car Heating Co.
Wine Ry. Appliance Co.

VENTILATORS, FRUIT CAR.
Wine Railway Appliance Co., The.

VENTILATORS, SHOP AND ROUNDHOUSE.
Buffalo Forge Co.
Dickinson, Inc., Paul.
Johns-Manville Co., H. W.

VESTIBULES, CAR.
Gould Coupler Co.

WASHERS.
National Malleable Castings Co.
Wine Ry. Appliance Co.

WASHERS, BOILER.
Sellers & Co., Inc., Wm.

WASTE, COTTON AND WOOLEN.
Dexter, P. Lillie Co.

WATER CINDER MILLS.
Whiting Corp.

WATER COLUMNS.
Pittsburgh-Des Moines Steel Co.

WATER COOLERS.
Giessel Co., Henry

WATERPROOFING.
Lehon Company.

WATER PURIFIERS.
Bird-Archer Co.
Refinite Co., The

WATER SOFTENERS.
Graver Corporation.
Refinite Co., The

WATER SOFTENING PLANTS.
Graver Corporation.
Refinite Co., The

WATER STORAGE TANKS.
Graver Corporation.

WATER TANKS.
Graver Corporation.
Pittsburgh-Des Moines Steel Co.

WATER TOWERS.
Graver Corporation.
Pittsburgh-Des Moines Steel Co.

WATER TREATMENT.
Dearborn Chemical Co.
Graver Corporation.
Refinite Co., The

WELDING, ELECTRIC ARC, APPARATUS.
General Electric Co.

WELDING, OXY-ACETYLENE.
Air Reduction Sales Co.

WELDING RODS.
Air Reduction Co.

WELDING SUPPLIES.
General Electric Co.

WHEEL, CAR.
Haskell & Barker Car Co., Inc.
Mt. Vernon Car Mfg. Co.

WHEEL CENTERS, DRIVING.
American Locomotive Co.
American Steel Foundries
Edgewater Steel Co.
Hunt-Spiller Mfg. Corp.
Standard Steel Works Co.

WHEEL LATHES.
Manning, Maxwell & Moore, Inc.
Niles-Bement-Pond Co.

WHEEL PRESSES.
Manning, Maxwell & Moore, Inc.

WHEEL PRESSES, HYDRAULIC.
Niles-Bement-Pond Co.
Sellers & Co., Inc., Wm.

WHEELS, CAR AND LOCOMOTIVE.
American Locomotive Co.
American Steel Foundries.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Lima Locomotive Works, Inc.
Midvale Steel & Ordnance Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Railway Steel-Spring Co.
Standard Steel Works Co.

WHEELS, MOTOR CAR, PRESSED STEEL.
Mudge & Co.
Fairbanks, Morse & Co.

WHISTLES.
Ashton Valve Co.
Crosby Steel Gage & Valve Co.
General Electric Co.
Manning, Maxwell & Moore, Inc.
Westinghouse Air Brake Co.

WINDOW SCREENS, CAR—(SEE SCREENS).
Midvale Steel Co.

WIPING AND PACKING WASTE, COTTON AND WOOLEN.
Dexter, P. Lillie Co.

WIRE.
American Steel & Wire Co.
B. F. Goodrich Rubber Co.
Kerite Insulated Wire & Cable Co.
Okonite Company.

WIRE, BARBED.
American Steel & Wire Co.

WIRE AND CABLES.
American Steel & Wire Co.
Kerite Insulated Wire & Cable Co.

WIRE, COPPER - COVERED STEEL.
Copper Clad Steel Co.

WIRE FENCING.
American Steel & Wire Co.
Interstate Iron & Steel Co.

WIRE GLASS
Mississippi Wire Glass Co.

WIRING SUPPLIES.
General Electric Co.

WIRE, INSULATED.
American Steel & Wire Co.
B. F. Goodrich Rubber Co.
General Electric Co.
Habirshaw Electric Cable Co.
Kerite Insulated Wire & Cable Co.
Okonite Company.

WIRE, ROPE.
American Steel & Wire Co.

WOOD PRESERVATIVES.
Barrett Co.
Detroit Graphite Co.

WRECKING CRANES — (SEE CRANES, WRECKING).

WRENCHES, PORTABLE.
Chicago Pneumatic Tool Co.

Capability and Performance

Few systems of operation or of apparatus in railway service perform their expected functions with the degree of certainty that characterizes the functioning of the automatic signal system and the air brake system.

Individually and as a team their performance has a record well-nigh perfect.

As a team, their efficiency depends upon the driver. Ordinarily, there is no mechanical connection that exercises the influence of double harness. There is nothing that unites their functions except the engineman, his realization of his position and his unerring performance of the duty indicated to him.

The Miller Train Control *compels* the operation as a unit of these two essentials to safe and intensive service.

View on Entrance Side of Logansport Erecting Shop Showing Transfer Table

More Miles Per Day

Adequate terminal facilities insure *prompt* service for all rolling stock owned. The result is a reduction in the number of bad order cars, more miles per day and more tons per car.

In providing such facilities, Austin renders a real service to the country's railroads. Austin clients in this field are, among others, The Toledo and Ohio Central Railroad, Philadelphia and Reading Railroad, Raritan River Railroad, Chesapeake and Ohio Railroad, Long Island Railroad, and the Pennsylvania Lines.

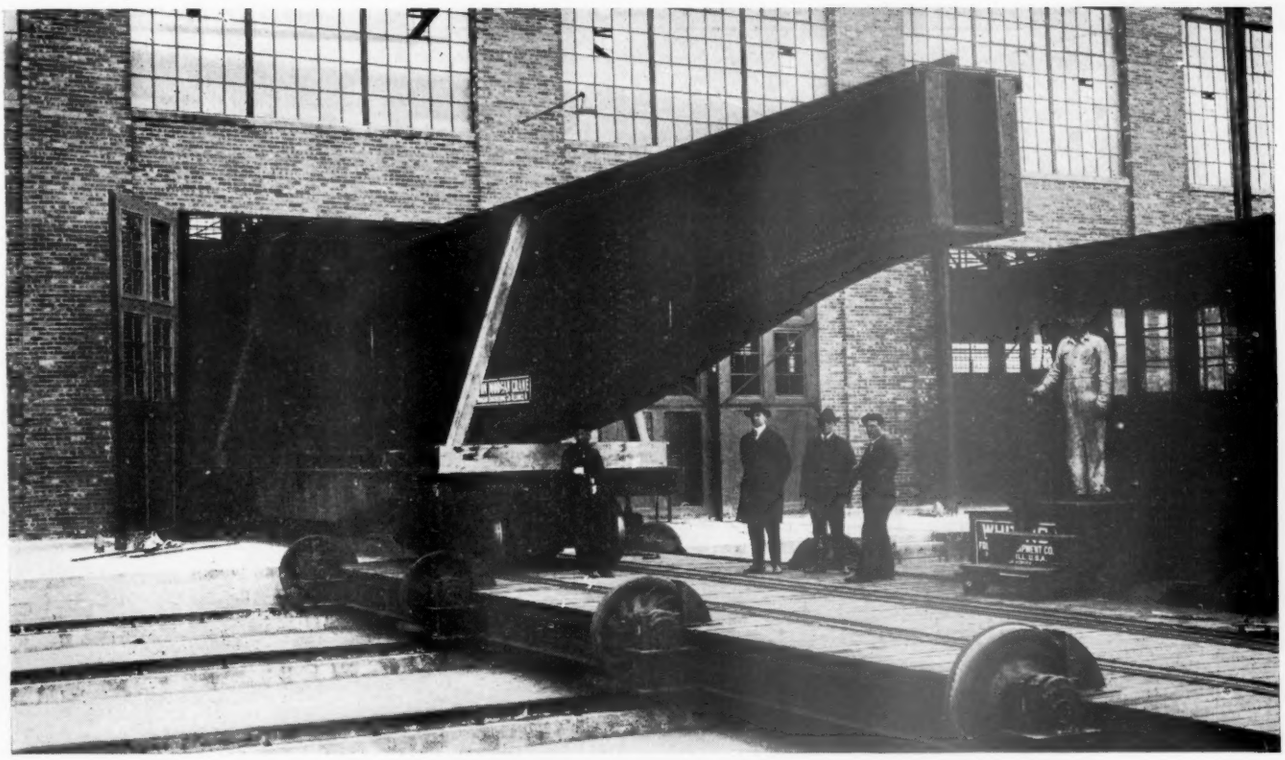
THE AUSTIN METHOD

Because time is an important factor when terminals and other Railway buildings are needed, Austin Service is especially advantageous. The Austin organization comprises men trained by *actual experience* to handle every detail of Engineering, Building and Equipment. No time is lost from the inception of the plan to the completion of the project.

Where Austin complete service is not required, a partial service based on your individual requirements is available.

AUSTIN

STANDARD AND SPECIAL RAILWAY-BUILDINGS



One of the Girders for 250-ton Crane, entering Shop Building at Logansport, Ind. This Crane was erected and equipped by The Austin Company.

More Tons Per Car

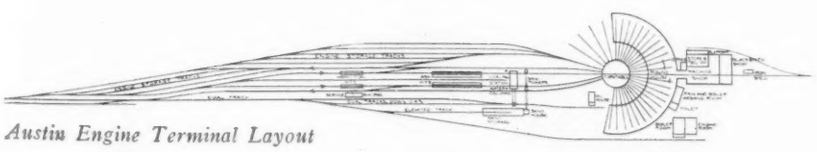
Austin specialists will be glad to cooperate with you, supplementing your engineering with Austin Construction. You can profit from the proved experience of other railroads for whom Austin has built.

If you need additional shop or terminal facilities—and want them quickly—wire, phone or write our nearest office for a conference. You incur no obligations.

Send for the Austin Book of Railway Buildings.

THE AUSTIN COMPANY, Cleveland, Ohio

Industrial Engineers and Builders



Austin Engine Terminal Layout

For U. S. A. and Canada, address nearest office

CLEVELAND...16125 Euclid Avenue, Eddy 4500
CHICAGO..1374 Continental Commercial Bank Building, Wabash 5801
DETROIT.....1452 Penobscot Bldg., Cherry 4466
PITTSBURGH....493 Union Arcade, Grant 7205
PHILADELPHIA.....1026 Bulletin Bldg., Spruce 1291
NEW YORK.....217 Broadway, Barclay 8886
SAN FRANCISCO.....817 Pacific Building Sutter 5406
DALLAS.....627 Linz Building X-5914

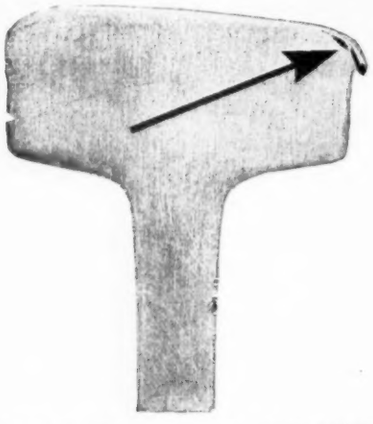
Export Representative: International Steel Corp., 51 Chambers St., New York City

AUSTIN

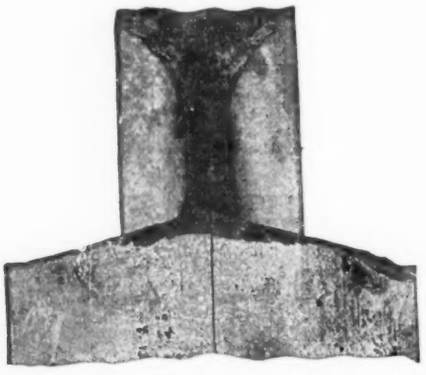
ENGINEERING, BUILDING AND EQUIPMENT

Get longer and safer service from your rails!

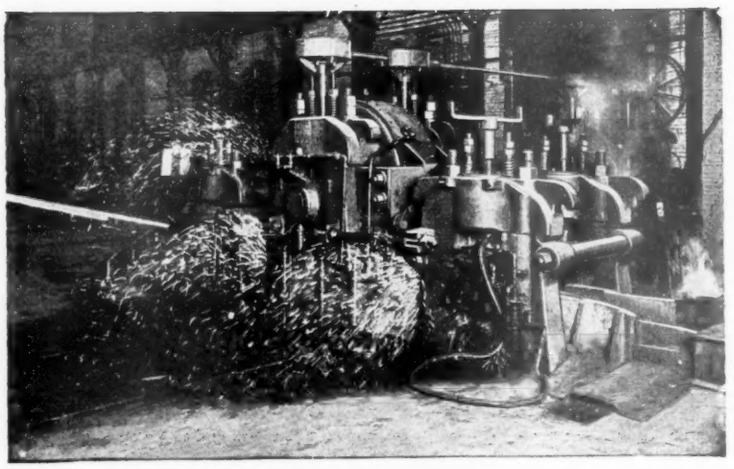
From the standpoint of wear, the running heads of rails ought to be very hard. From the standpoint of safety, the rail base ought to be as hard as the interior and just as free from metal weakness. And only by taking these conditions into consideration can you provide for the lowest track maintenance costs—that is, for a minimized amount of rail breakage and longest life on the running surface.



A typical condition that develops with ordinary rails in service. The weak, partially decarburized metal on top surface has sloughed off under the cold-rolling action of the car wheels. The Lackawanna Deseaming Process removes this weak head metal before the rail is finished.



Typical longitudinal seam in the base of a fractured rail. The gradual opening of such a seam and penetration into the interior metal is a prolific cause of rail breakage in service. The Lackawanna Deseaming Process removes the seamy metal and leaves no dangerous laminations, streaks or cracks in the base.



The Lackawanna Deseaming Machine which mills the soft, partially decarburized metal from the location of the rail head and base, the milling process being applied to the partially rolled rail and permitting the finishing rolls to complete the work on hard, dense interior metal.

Lackawanna

Deseaming Process

eliminates weak surface metal

Under ordinary manufacturing methods, rails always have a surrounding shell of weak metal, because the soft, partially decarburized ingot surface is rolled into the finished product.

The only proven way to get the desired hard running surface and sound base essential to rail efficiency and economy is to *eliminate the weak metal* at the important head and base locations.

ALL LACKAWANNA RAILS ARE DESEAMED

You can get the greatest degree of protection only by going a step further than ordinary practice, and insisting that *weak, partially decarburized surface metal be milled off the hot bar at the location of the rail head and base, such milling to be done at some point in the rolling process that will permit the finishing passes to be carried out on the clean, strong interior metal.*

Do this and you will find on microscopic inspections and test that the harmful seams, streaky laminated metal and soft spots have been replaced by a sounder, harder metal, which will retain its homogeneity under any service conditions.

Years of service have now demonstrated that Lackawanna Deseamed Rails, made in this way, have a very just claim to superiority.

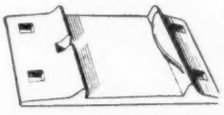
If reduced maintenance expense, safer track and greater load capacity for a given rail section are worthy of your careful study, send for our book "The Lackawanna Deseaming Process."

Other Lackawanna Aids to Better Track

The Lackawanna Safety-Head Angle Bar

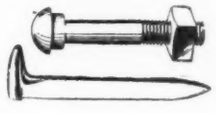
overcomes liability to wear and fracture by preventing cutting of the bar at the top from back action or upward thrust of the rail ends. This is accomplished by a slight depression in the head of the angle bar for a short space at the center where the rail ends meet.

The Lackawanna Hook-Shoulder Tie Plate



is simple, strong, durable, convenient for installation, and by holding the rail with great security prevents undue wear and destruction of material, saves repair costs and reduces maintenance labor.

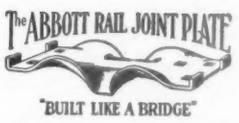
Two ribs on top form a channel in which the rail base rests. One of the ribs is plain and the other hooked to make a holder. One or two plain spikes on the plain rib complete the bond between plate and both rail flanges. The plate is fastened to the tie by independent plain or screw spikes. The rail may be removed without disturbing the plate.



Lackawanna Track Bolts and Spikes

Our track bolts and spikes, of all standard sizes for light or heavy rails, enjoy an enviable reputation for careful, accurate workmanship and finish.

The Abbott Rail-Joint Plate



strengthens and otherwise improves ordinary angle bar joints of standard and light tee and girder rails. Its use assures smooth running track surface without the necessity of constantly raising and tamping the joint ties, avoids annoyance and expense from worn and broken bolts and angle bars and protects the rail ends from battering and breaking down.

The hard steel and combination of reversing flange with the plate provides for internal stresses and imposes the load on the two joint ties with about the same action as between a short deck bridge and its piers. Upturned corner lugs engaging the ends of the angle bars act as anti-creepers and as rail guards to prevent misalignment if the angle bars break or become loose.

Abbott Plates are equally applicable to and advantageous on new or relaid track and will extend the life even of old track for several years.

These plates are made in types especially suitable for ordinary steam railway service, for use in paved streets, and for welding to the rail base, and may be held with either screw or ordinary spikes.

Write for our Booklet
"Improved Track Appliances"

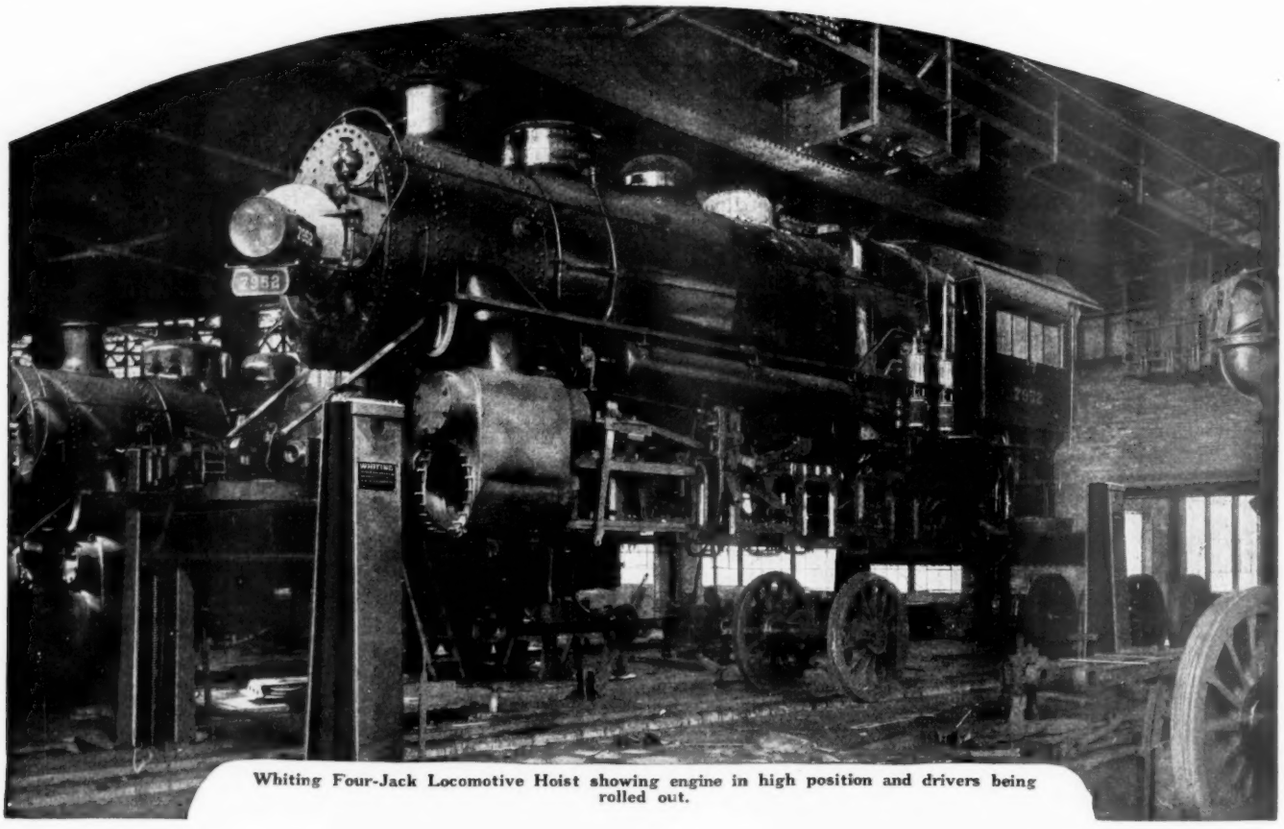
Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.

Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia San Francisco St. Louis

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTEEL CONSOLIDATED STEEL CORPORATION 165 BROADWAY, NEW YORK, U. S. A.

509



Whiting Four-Jack Locomotive Hoist showing engine in high position and drivers being rolled out.

Getting the Most Out of Each Locomotive

CRANES

Cupolas Converters
Dust Arresters
Tumblers Ladles
Core Oven Equipment
Cars and Trucks
Turntables Tramrails
Elevators Air Hoists
Brass Furnaces
Malleable Furnaces

Locomotive Hoists
Coach Hoists
Transfer Tables
Turntable Tractors

Every locomotive spends a considerable time in the repair shop, but this "out of service" period can be greatly reduced by having adequate wheeling and unwheeling facilities at division points and terminal shops so that an engine may be put through the repair shop in a minimum time.

The Whiting Locomotive Hoist is a big factor in reducing this "out of service" period. It will handle any type or size of locomotive in a fraction of the time required on a drop pit and with less labor.

Operating figures and catalog on request.

WHITING CORPORATION

(Formerly Whiting Foundry Equipment Co. and American Foundry Equipment Co.)

General Office and Works: Harvey, Illinois

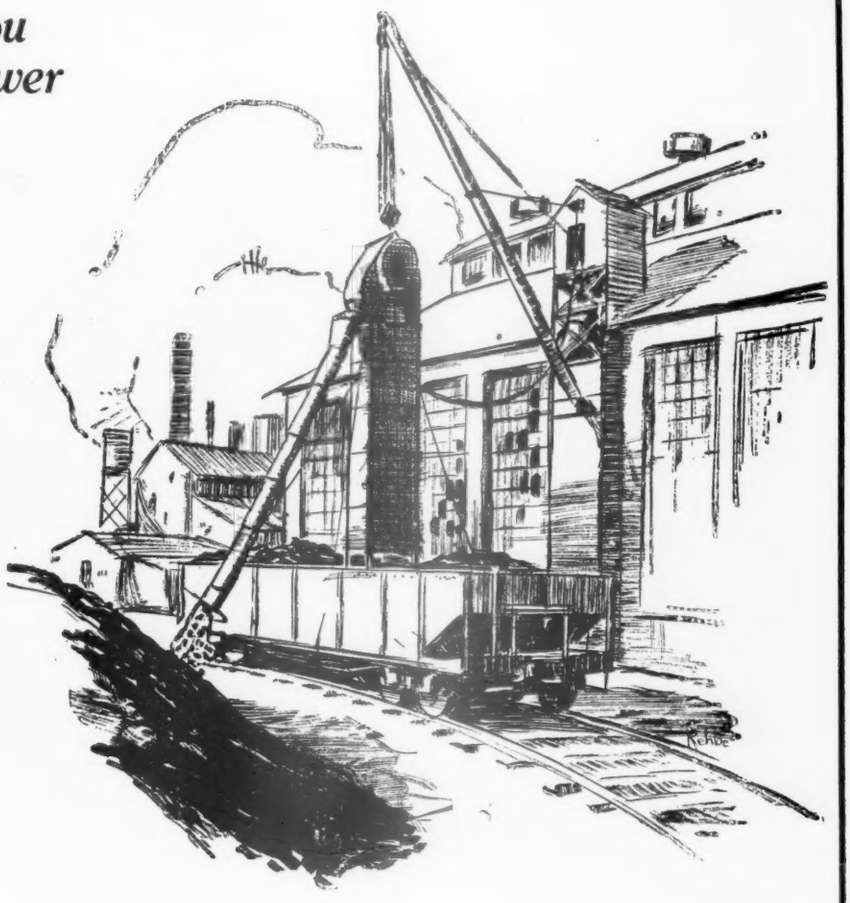
Representatives in 25 Principal Cities

WHITING

CRANES OF ALL TYPES / FOUNDRIES EQUIPPED COMPLETE

More Tons Per Hou
Less Labor and Power
Let's Go to Work
Buy Now

The DEMAYO PORTABLE ELEVATORS and CONVEYORS



Have achieved an enviable record for economy in operation.

They are as near wear-proof as can be attained, and to further enhance their durability all the parts are interchangeable and can be replaced quickly should necessity require.

A DEMAYO ELEVATOR doing the work of 20 to 30 men is not a big day's work for one of our machines.

Ideal for Cinder-pit work—Operated from a light, inexpensive hand-operated "A" frame type of traveling crane, operating on rails spanning tracks and cinder-pits. Always in the clear.

Whenever you permit a gang or gangs of men to handle bulk flowing material that could be better handled by one of our machines, you are robbing yourself of earnings that should be yours.

THE DEMAYO SYSTEM OF DIGGING, ELEVATING AND CONVEYING has increased the efficiency of its purchasers in every instance.

Many jobs are still being done by laborers that DEMAYO ELEVATORS AND CONVEYORS could do faster and at a big saving in money.

It means getting your work done by the fewest possible workers with the largest possible production at the LOWEST POSSIBLE COST.

Cut out your useless payroll expense and get down to bedrock efficiency. BUY NOW.

WRITE FOR CATALOGUE A.

THE DEMAYO ENGINEERING CORPORATION

Designers and Manufacturers of Portable Elevators, Unloaders and Conveyors

Factory:
Long Island City

Executive Offices:
Pier 62, North River, West 23rd Street, New York City

The Comfortable Way to Protect Eyes

STOCO SAFETY GOGGLES
(Pat. Dec. 12, 1916)

with

"CELOGLAS" Shatter-Proof Lenses

A safety goggle may be efficient in every other respect but if it cannot be put on and then forgotten; if it cannot be worn day in and day out for long hours at a stretch without irritating the nose or tiring the eyes, if, in short, it is not thoroughly comfortable, it is not a practical protection glass—neither is it a Stoco Safety Goggle.

The patented one-piece front construction of the Stoco Safety Goggle, in addition to increasing the protection afforded (see illustrations) makes possible a very wide smooth bridge which comfortably distributes the weight of the goggle over a wide area instead of uncomfortably concentrating it on the sensitive bridge of the nose. This feature, combined with the light weight of the Stoco Safety Goggle results in a protection glass that is truly comfortable.

Celoglas Shatter-Proof Lenses—laminated lenses which cannot shatter into the eye—are plane and practically colorless so that they cannot tire or strain the eyes. (Incidentally, Stoco Safety Goggles may be worn over regular glasses if desired.)

If you are responsible for the buying of eye protection for your shop or plant and have not yet found a really comfortable protection glass we suggest that you try out the Stoco Safety Goggle. A request on your own or your firm's letterhead will bring you a sample by return mail. There will be no charge or obligation.

The Stoco Safety Goggle

Price Each
(F. O. B. Geneva, N. Y.)

Set with "Celoglas" Shatter-Proof lenses	$1.15
Set with optical glass lenses	.90

Attractive discounts for quantity orders. Easy cable earbows or black elastic headbands at the same price.

THE STANDARD OPTICAL CO.
GENEVA, N.Y. U.S.A.

It will be of vital importance that adequate steps be taken to eliminate the great loss on railways arising from Absenteeism, Overtime, Waste, Labor Turnover and Under-production. As an operating head, you are no doubt giving this matter consideration.

It should be thoroughly realized that this great loss arises mainly from the mental attitude of your workers. Failure to realize this basic fact is costing many employers large sums and is standing between them and a proper solution.

It should also be realized that the negative mental attitude of your workers is the direct fruit of the destructive education which they have received.

Your workers produce only as much as they *think* they ought to produce. The negative results which are in evidence in many directions abundantly prove the prevailing negative mental attitude.

Our success in the field of constructive education for workers has built for us the largest business of its kind in the world. Our work is not an experiment in any sense but has been tried and tested hundreds of times in practically every basic industry on this Continent. Our clients include numerous large concerns, working as high as 100,000 men or more each. We have only one product to sell, and that is our proven ability to increase results for management.

Ask our nearest office to send a representative to explain how you can profitably use our constructive work on your property.

SHERMAN SERVICE INC.

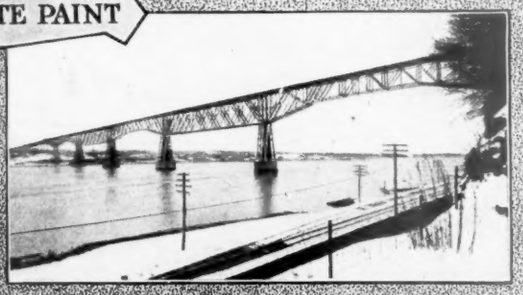
Production Engineering
Industrial Co-ordination

Boston 10 State St.	New York 2 Rector St.	Chicago 208 So. La Salle	Philadelphia 1211 Chestnut St.	St. Louis 314 No. Broadway
Cleveland Park Building	Detroit 73 State St.	New Haven 42 Church St.	Providence 10 Weybosset St.	Toronto 10 Adelaide St. East
	Pittsburgh 401 Wood St.	Kansas City Reliance Building	Montreal Drummond Building	

Largest organization of its kind in the world

SHERMAN SERVICE

SUPERIOR GRAPHITE PAINT
It Prevents Rust



True Economy In Protection

When you specify paint for protection you should select for your work the paint that has proven its worth in service. Its use will mean utmost satisfaction in the long run.

For thirty-five years Superior Graphite Paint has been giving maximum service on structural steel and metal surfaces in all sections of the country—positive protection at lowest ultimate cost.

For true economy—for savings on material and up-keep bills—specify Superior Graphite Paint. It will give years of service and is a safe investment in the long run. It can be used without the hazard of experiment. It is one of the Degraco line of dependable paints.

Color Cards and Painting Specifications on Request

DETROIT GRAPHITE COMPANY
Makers of
Paints in all Colors for all Purposes
511 TWELFTH STREET DETROIT, U. S. A.

Sold through Branch Offices with Warehouse stocks in all Principal Cities

Manufactured in Canada by
Dominion Paint Works Limited, Walkerville, Canada

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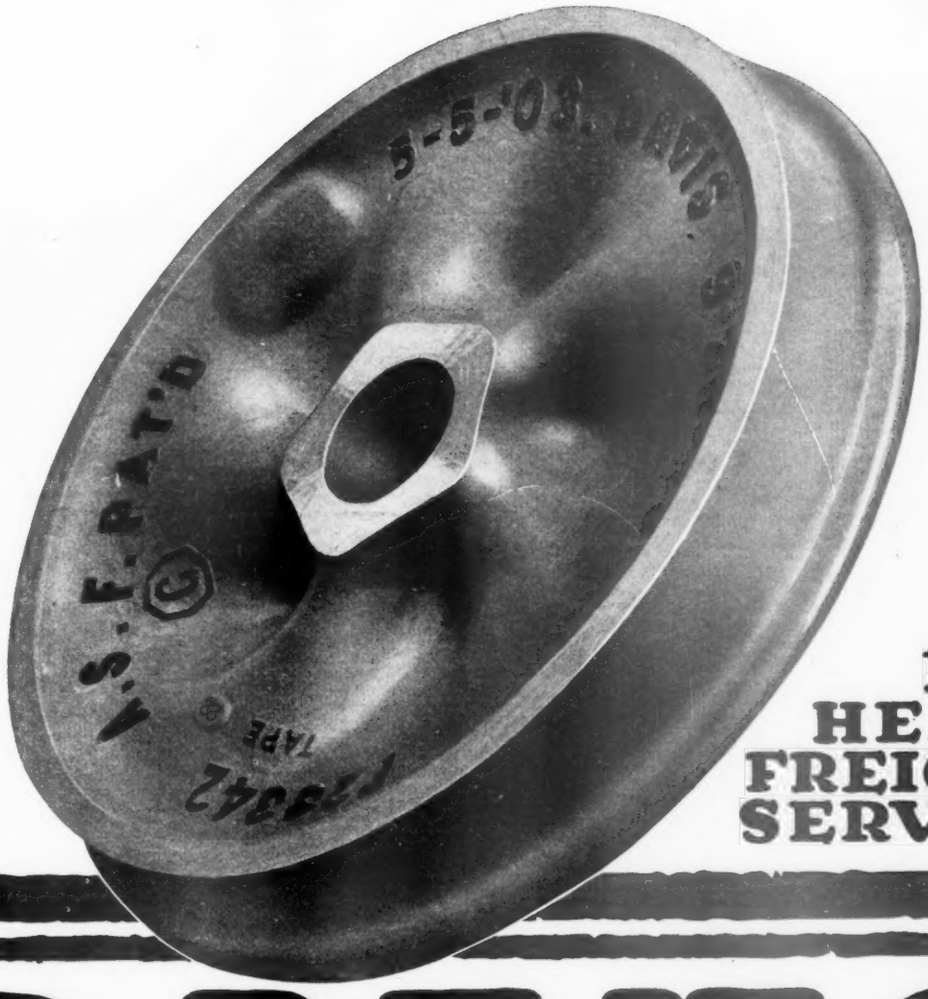
DEGRACO PAINTS

All Colors for All Purposes



FOR HEAVY FREIGHT SERVICE

DAVIS STEEL WHEEL

The manganese steel in the tread resists abrasion and thus reduces slid-flats to a minimum. Of approximately 135,000 Davis Wheels placed under 40 and 50 ton freight equipment on a certain road since 1911, only ¾ of 1% have been removed for slid-flats.

American Steel Foundries

NEW YORK CHICAGO ST. LOUIS

KREOLITE WOOD BLOCK FLOORS

Outlast the Factory

The World Asks—

Kreolite Answers With a New, Odorless Antiseptic Floor for the Food Industry

IT was a four-fold problem. To make a floor of enduring strength; to treat the blocks with an odorless preservative; to insulate the floor so it would not condense vapor from the air; to prevent moisture from creeping in from beneath. This is what the food industry asked of our Factory Floor Engineers, and how they solved this problem.

It proves again to the world that Kreolite Floors are not only a satisfactory floor surface, but *more—a satisfactory Floor Service.*

The Merrell-Soule Co., manufacturers of "Klim" Powdered Milk, had long sought a solution for their floor troubles. The hard, stone-like floors not only held moisture but gathered it. Their storehouses must be as dry as powder houses—to preserve the powdered milk, in a dry, clean, and sanitary condition.

Our Engineers went to work; our Chemists assisted. The outcome was a new Kreolite Odorless Antiseptic Wood-Block.

The Merrell-Soule Co., of Syracuse, N. Y., are using these blocks at their Little Valley, Arcade, Attica, Bliss and Warsaw, N. Y., plants and at Union City, Pa. Since these floors have been installed in the storehouses of the Merrell-Soule Co., the results have been perfectly satisfactory, and all former obstacles have been *permanently* overcome.

The Kreolite Odorless Antiseptic Wood Blocks are particularly well adapted for use in packing houses, wholesale groceries, confectioneries, canneries, condenseries, bakeries, dairies and all branches of the food industry.

Like other Kreolite Floors, this new floor is treated to prevent decay; then laid with the tough end grain of the wood uppermost.

In treating the blocks, the preservative oils are refined to eliminate all odor without interfering with the long-wearing qualities of the floor.

If you have floor difficulties of any kind, write us. Our Engineers will help you as they have thousands of others without your being obligated.

Tell us your problems, or write for our booklet on Kreolite Floors.

Address the Toledo Office

The Jennison-Wright Company,
2465 Broadway, Toledo, Ohio

Branches: Albany, Chicago, Boston, Philadelphia, St. Louis, Pittsburgh, Cleveland, Detroit, Toronto and other principal Cities.

Western Sales Distributors—Western Wood Preserving Company, Spokane, Washington.

British Distributors—Anglo-American Agency, Royal Liver Building, Liverpool, England

Patented
May 13, 1913
May 6, 1919

Corner of one of the dry, sanitary storehouses of the Merrell-Soule Co., showing odorless antiseptic non-absorbent Kreolite Block Floors.

Ask the men who use them

Wherever the new Duff High-Speed Jacks have been thoroughly tried out—in car and locomotive repair shops and for bridge work—the men who use them are enthusiastic about their many advantages over old style jacks.

The shop foremen are pleased because Duff High-Speed Jacks are so much easier to handle that fewer men are needed and time is saved. Duff Jacks are easy to move and spot because most of the weight is in the base instead of in the top. Wheels, either attached or removable, are provided, so that no time need be lost hunting up a truck.

The workmen who actually use them like Duff Jacks, because they are safe, rapid, and easy to operate. A positive clutch holds the load at all times, whether raising or lowering. A handle provides absolute control of lowering speed. Although extremely rapid for their capacity, Duff Jacks raise the load with minimum effort. Accurate workmanship and use of bronze nut with steel screw greatly reduce friction.

Duff High-Speed Jacks are made in 50 and 75-ton capacities, and with heights to suit every job.

Write for the new Duff Catalog 104, a 148-page book which describes jacks for every purpose

THE DUFF MANUFACTURING COMPANY
General Offices and Works: Pittsburgh

Branch Offices: New York, Chicago, Atlanta, Houston, St. Louis, San Francisco.

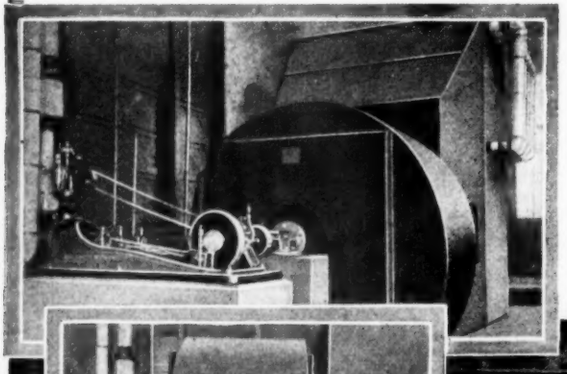
DUFF *High-Speed Ball-Bearing* JACKS

The Season Makes No Difference

When your roundhouses are equipped with

"Sirocco" *Heating and Ventilating Systems*

It is difficult, almost impossible to inspect snow covered locomotives as illustrated above.
Yet it is under such adverse conditions that roundhouses, the main centre of activity must many times be operated.
Heated air as supplied to the pits by *"SIROCCO"* Equipment melts the ice and snow rapidly, speeds up inspection, makes it more careful and keeps the roundhouse clear.

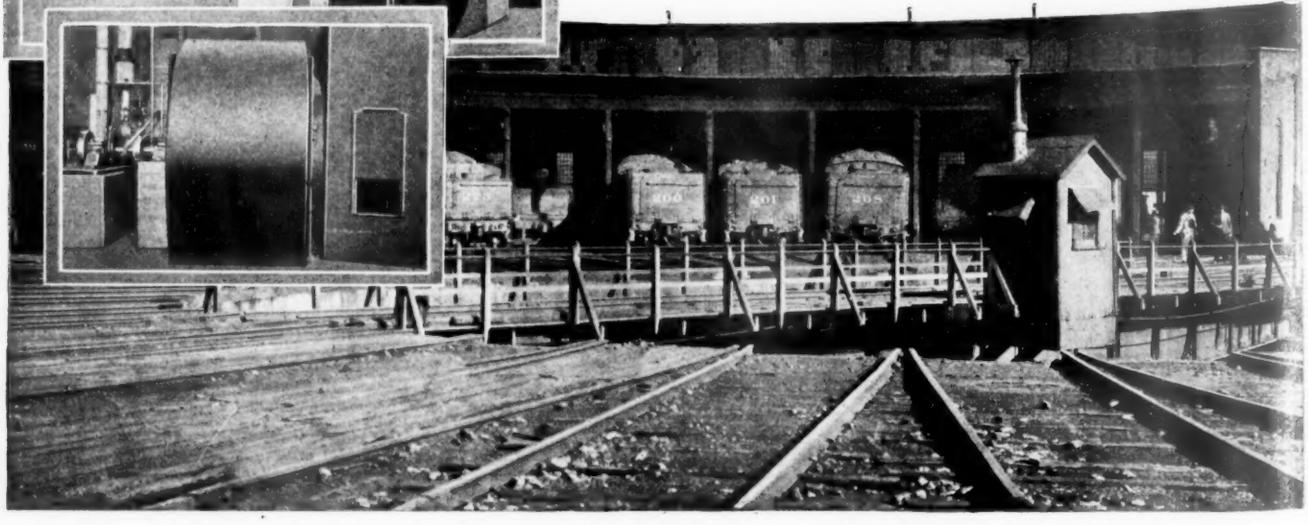


Passenger and freight schedules depend on the roundhouse for engines—*Sirocco* equipment prepares you to meet the operating needs of the worst kind of weather. Our engineers will assist you in selecting a size and type to suit your requirement.

Send for our "A B C Equipment for Railroads" Booklet

AMERICAN BLOWER COMPANY

General Offices: Detroit, Mich.



Goodrich also makes car heating, tender, steam, air brake, pneumatic tool, water and fire hose; packings, belts, including axle lighting belts.

Goodrich Car Cleaning Hose

FOUNDED 1870

TRADE MARK

Why Goodrich Hose?

IF it lasts a little longer; if it does the work a little better; if it makes the workman's job a little easier—*then it pays.*

The ability of *all* Goodrich Rubber Products to do these things—from the vacuum hose that cleans the coach to the steam hose that heats it—is individually and collectively recognized.

The outstanding features of Goodrich Vacuum Hose are flexibility, balanced construction and durability.

THE B. F. GOODRICH RUBBER CO.
Akron, Ohio

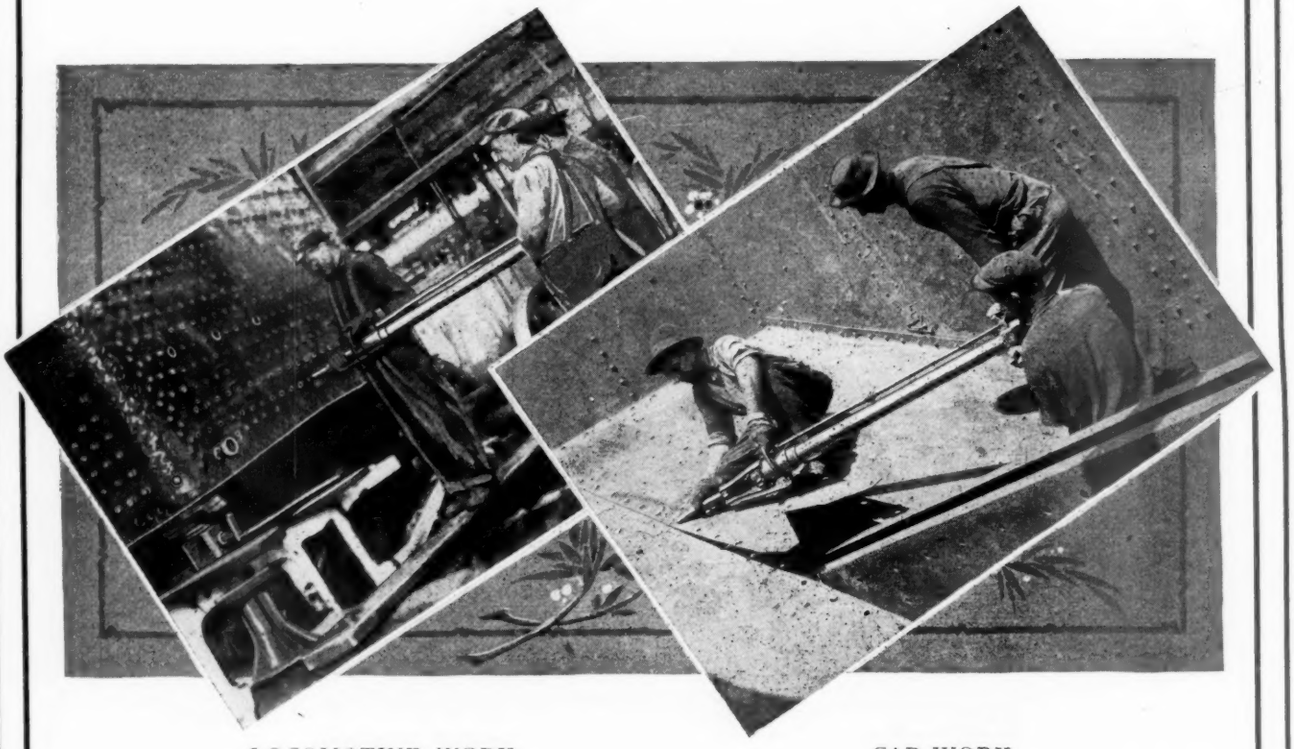
CUT RIVETS OFF COLD

with the

CINCINNATI RIVET CUTTING GUN

Economical—Safe—Durable

PATENTED AND PATENTS PENDING



LOCOMOTIVE WORK CAR WORK

Practically all of the biggest Railroads use Cincinnati Rivet Cutting Guns in their Repair Shops because they save labor—they are dependable and economical—they are absolutely safe, because of their two big safety features, and because their worth has been definitely proven.

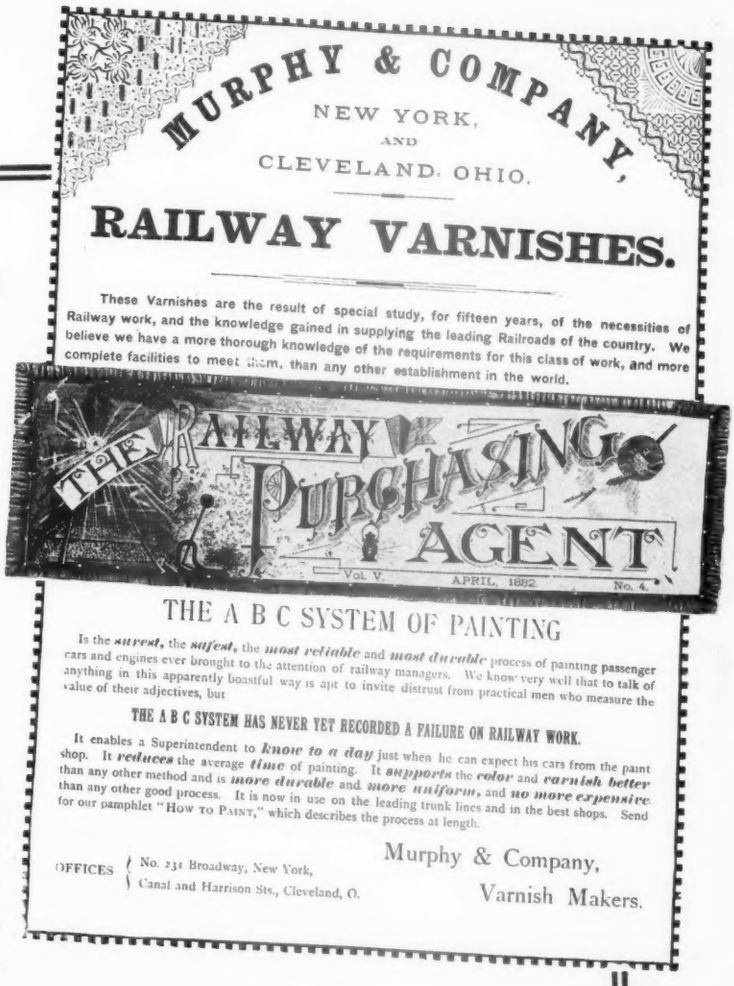
RIVET CUTTING GUN CO.

115 EAST THIRD ST. **CINCINNATI, OHIO**

PERSISTENT QUALITY

WHAT we "believed" we had forty years ago, Railway officers today *know* that we have—*"The varnish that lasts longest."*

Forty years ago—when the advertisement reproduced here was published—we stated that "MURPHY RAILWAY VARNISHES were the result of fifteen years of special study," and that we *"believed"* that we had a more thorough knowledge of the requirements of varnish for railway work, and more complete facilities to meet them, than any other establishment in the world.



MURPHY & COMPANY,
NEW YORK,
AND
CLEVELAND, OHIO.

RAILWAY VARNISHES.

These Varnishes are the result of special study, for fifteen years, of the necessities of Railway work, and the knowledge gained in supplying the leading Railroads of the country. We believe we have a more thorough knowledge of the requirements for this class of work, and more complete facilities to meet them, than any other establishment in the world.

THE RAILWAY PURCHASING AGENT

VOL. V. APRIL, 1882. No. 4.

THE A B C SYSTEM OF PAINTING

Is the *surest*, the *safest*, the *most reliable* and *most durable* process of painting passenger cars and engines ever brought to the attention of railway managers. We know very well that to talk of anything in this apparently boastful way is apt to invite distrust from practical men who measure the value of their adjectives, but

THE A B C SYSTEM HAS NEVER YET RECORDED A FAILURE ON RAILWAY WORK.

It enables a Superintendent to *know to a day* just when he can expect his cars from the paint shop. It *reduces* the average *time* of painting. It *supports* the *color* and *varnish better* than any other method and is *more durable* and *more uniform*, and *no more expensive* than any other good process. It is now in use on the leading trunk lines and in the best shops. Send for our pamphlet "HOW TO PAINT," which describes the process at length.

Murphy & Company,
Varnish Makers.

OFFICES { No. 231 Broadway, New York, Canal and Harrison Sts., Cleveland, O.

Fifty Years of Service to the Railways of the Country

Today, at the end of over a half century devoted by us to railway varnish making, railway officers the country over—in the light of their experience with MURPHY RAILWAY VARNISHES and other Perfect Finishing Materials—*know* that we have

In short, the long record of Murphy Service to Railway Paint Shops has alone been made possible by the long service records of Murphy products in Railway work—records which have demonstrated the Persistent Quality of Murphy varnishes and other Murphy products.

Murphy Varnish Company

NEWARK CHICAGO

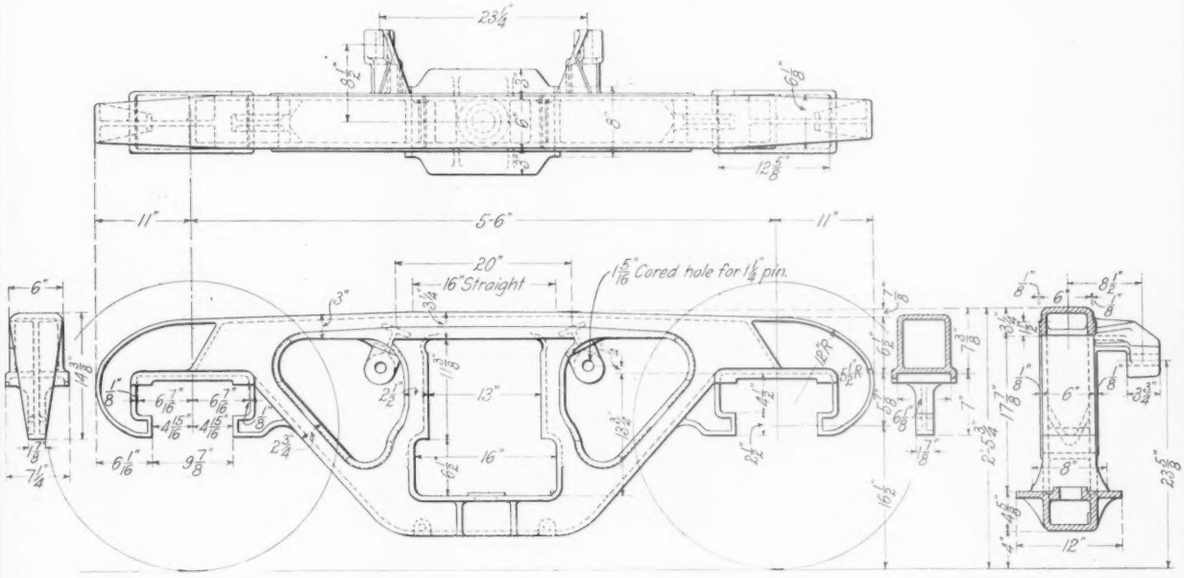
The Dougall Varnish Company, Limited, Montreal
Canadian Associate

RAILWAY
STEEL-SPRING
COMPANY
GENERAL-OFFICES
30 Church St., New York.
BRANCHES
Chicago
Denver
Detroit
Louisville
Mexico City
St. Louis
St. Paul
Norfolk
New Orleans

THE

UNIVERSAL PEDESTAL TRUCK

Side Frame



Has been designed with a view to reducing the amount of material and the number of parts that need to be carried in stock for repairs.

It is built without bolts, rivets or tie bars.

It is interchangeable with the side frames of trucks using any standard make of A. R. A. journal box.

In applying this side frame the design of truck need not be altered.

The distribution of metal is such that the strength of the truck is increased and the weight of the car decreased.

For detailed prints or further information write to

SCULLIN STEEL CO.

STEEL PRODUCTS

ST. LOUIS	NEW YORK	CHICAGO	ST. PAUL
Main Office & Works	2050 Grand Central Terminal	1022 McCormick Bldg.	Merchants Bank Bldg.

We Roll Standard Sizes

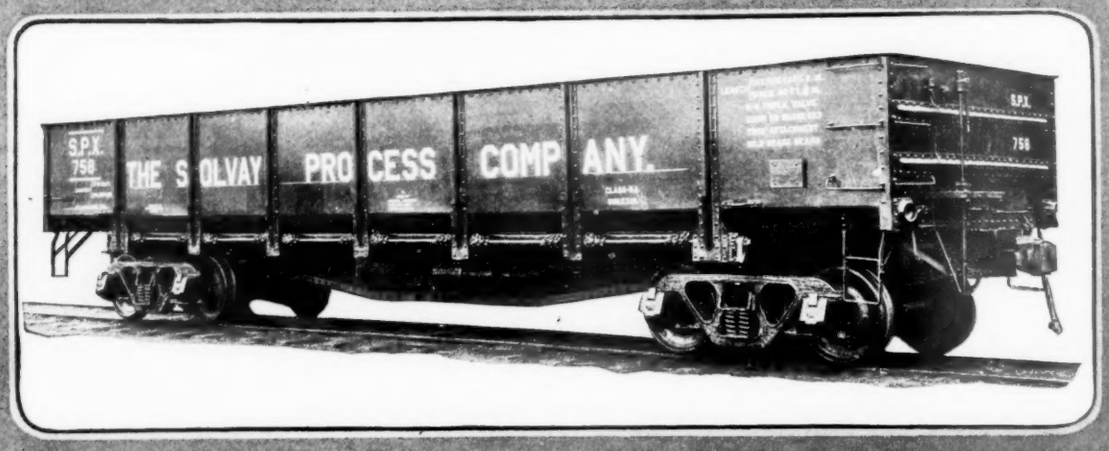
MERCHANT BAR

Squares, Rounds and Flats 6 in. and under.

STRUCTURAL SHAPES

Channels and Beams 8 in. and under. Angles up to 6 in.

Light rails up to 50 pounds. Special sections on request.



CARS

For anything and everything

THIS company serves every basic industry. If science will make a thing transportable, the company will build the car. Many revolutionary improvements in American car-building practice have been first introduced in its three great car shops.

Here is an all-steel gondola for extra heavy service — self-cleaning, with quick-acting drop bottom unloading device, and many other special features.

The "Fish Belly" type center sill and the extremely rigid construction insure long life, low maintenance cost and uninterrupted operation.

The accumulated knowledge and skill of the organization that produces this, and all other types of cars, is at the service of all car users, no matter where located, through the company's free Consultation Bureau.

Whether your requirements are standard, or whether they demand special modifications, the company is equally well equipped to fill them.

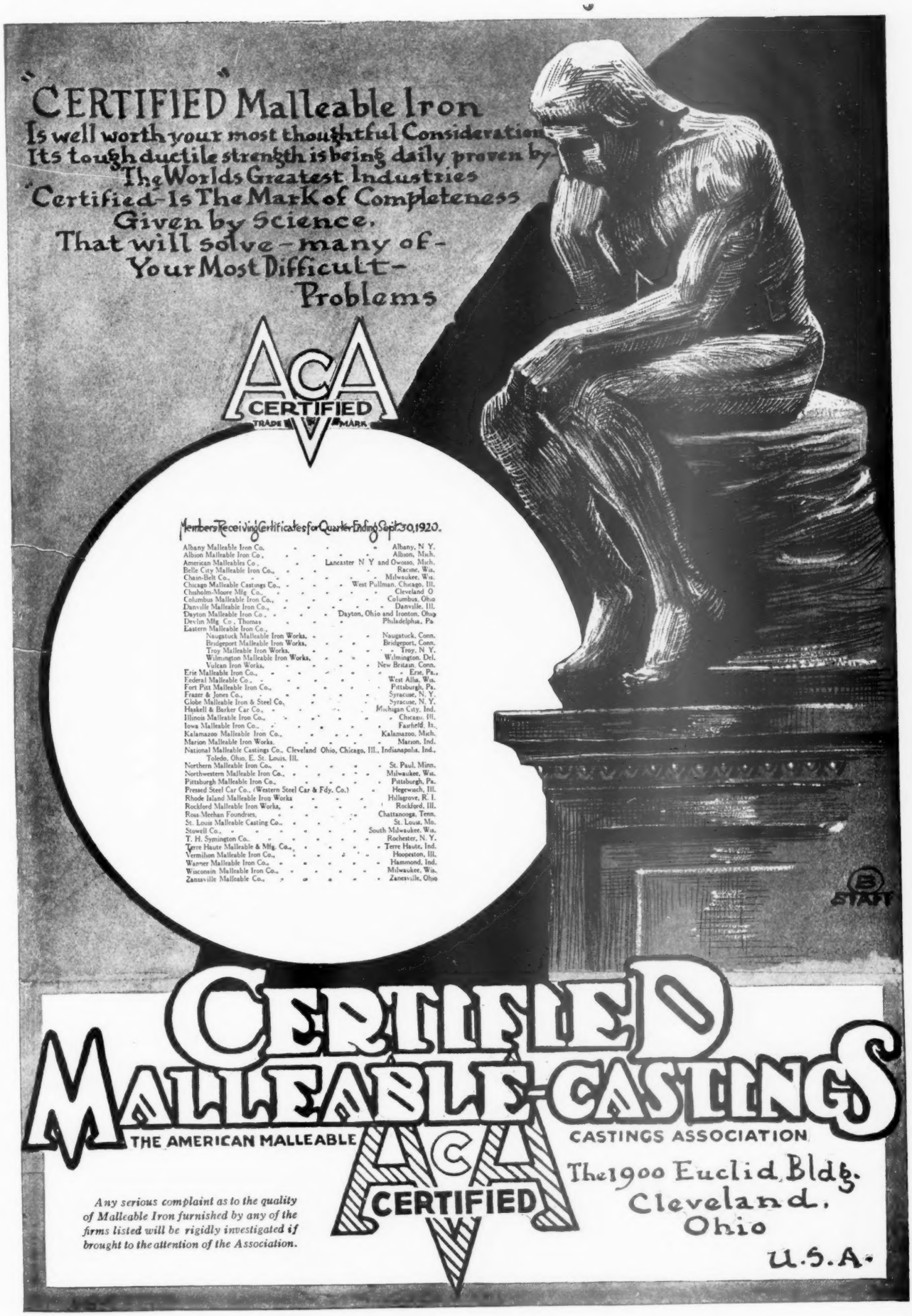
Just write the address below, stating the situation on which you wish to be advised.

GENERAL AMERICAN CAR COMPANY

Subsidiary of the General American Tank Car Corporation

General Offices: Harris Trust Bldg., Chicago, U. S. A.

Plants at: East Chicago, Ind.; Sand Springs, Okla.; Warren, Ohio
Sales Offices: 17 Battery Place, New York;
24 California St., San Francisco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Is well worth your most thoughtful Consideration
Its tough ductile strength is being daily proven by
The Worlds Greatest Industries
"Certified" Is The Mark of Completeness
Given by Science.
That will solve — many of —
Your Most Difficult —
Problems
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CERTIFIED
TRADE MARK
Members Receiving Certificates for Quarter Ending Sept. 30, 1920.
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Belle City Malleable Iron Co. — Racine, Wis.
Chain-Belt Co. — Milwaukee, Wis.
Chicago Malleable Castings Co. — West Pullman, Chicago, Ill.
Chisholm-Moore Mfg. Co. — Cleveland O
Columbus Malleable Iron Co. — Columbus, Ohio
Danville Malleable Iron Co. — Danville, Ill.
Dayton Malleable Iron Co. — Dayton, Ohio and Ironton, Ohio
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Northern Malleable Iron Co. — St. Paul, Minn.
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THE AMERICAN MALLEABLE
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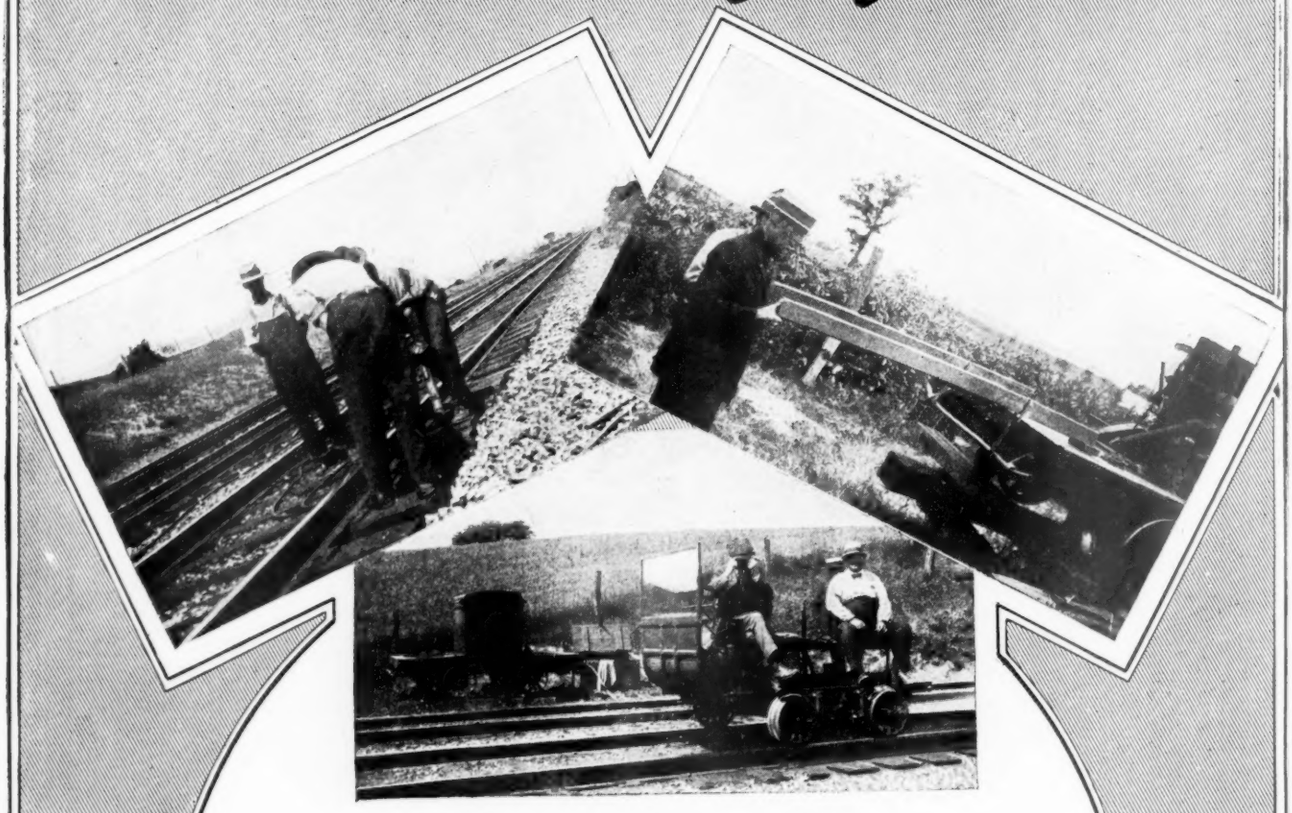
Cleveland.
Ohio
U.S.A.
Any serious complaint as to the quality of Malleable Iron furnished by any of the firms listed will be rigidly investigated if brought to the attention of the Association.

Nine Rails a Day by 3 Men



One Answer to Track Maintenance Costs

A section foreman and two men handle this two tool "Imperial" Tie Tamping Outfit and have an average of surfacing nine (9) rails a day. Without additional help, the three men move the compressor car from one car rest to another by using the set of lifting bars. The other men in the gang are left free for any other track work—in this instance mowing the right of way.

Compare this pneumatic tie tamping with old hand methods.

Imperial Tamping Outfits have proved real labor savers wherever used. They speed up track work.

Ingersoll-Rand Company

General Offices

11 Broadway, New York

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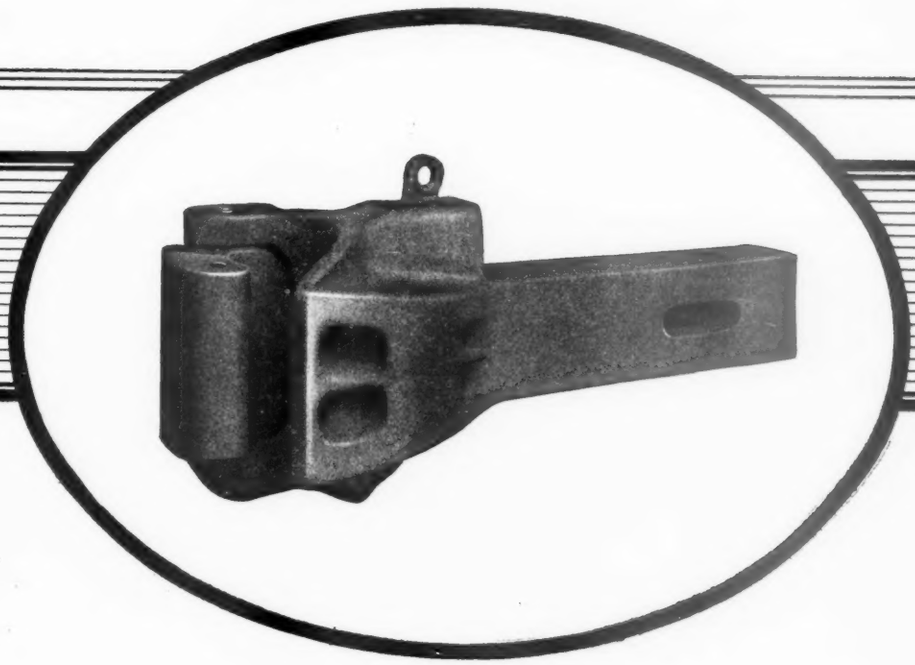
Ingersoll-Rand



A.R.A. Standard "D" Couplers

Made in both Top and Bottom Operating types

for

Freight, Passenger and Engine Service

This Coupler has been adopted by the American Railway Association as standard for Freight and Engine service, and is now required on all new equipment, and for repairs where possible to install.

The "SHARON" Coupler

Operates from either Top, Bottom or Side. Knuckles, Knuckle-Pins and Locks are interchangeable for all types

One-half and Three-quarter size M. C. B. type Couplers for narrow-gauge cars

THE NATIONAL MALLEABLE CASTINGS COMPANY

CLEVELAND SHARON, PA. CHICAGO MELROSE PARK, ILL. INDIANAPOLIS EAST ST. LOUIS, ILL. TOLEDO

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Other professions and businesses have similar associations with a high ethical standard.

From the advertiser's standpoint, the greatest and most useful co-operative organization is the Audit Bureau of Circulations, comprising advertisers, advertising agents and publishers.

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The experienced advertiser, before placing a contract for space, asks to be shown the A. B. C. credentials of the publication.

The RAILWAY MECHANICAL ENGINEER

is a member of the A. B. C.

The Bureau's report on its circulation is available to all advertisers.

SIMMONS-BOARDMAN PUBLISHING CO.

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WOOLWORTH BUILDING, NEW YORK

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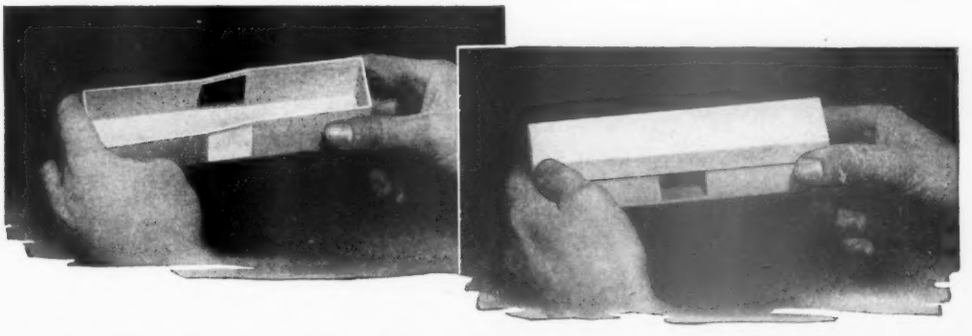
Every Publication is a member of the A. B. C. or has made application for membership.

THE ORIGINAL RECTANGLE

When a steel-frame or all steel box car is originally turned out of the shop its side plates and end plates form a rigid rectangle. To keep this rectangle in its original shape and make the side plates and end plates work in unison should be the aim of every car designer.

THE MURPHY SOLIDSTEEL ROOF Provides This Unity

PROVE IT YOURSELF



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COLUMBUS, OHIO

Design, Build and Repair
All Classes of Freight Cars
And Steel Underframes

Builders of
FREIGHT and PASSENGER CARS
since 1899

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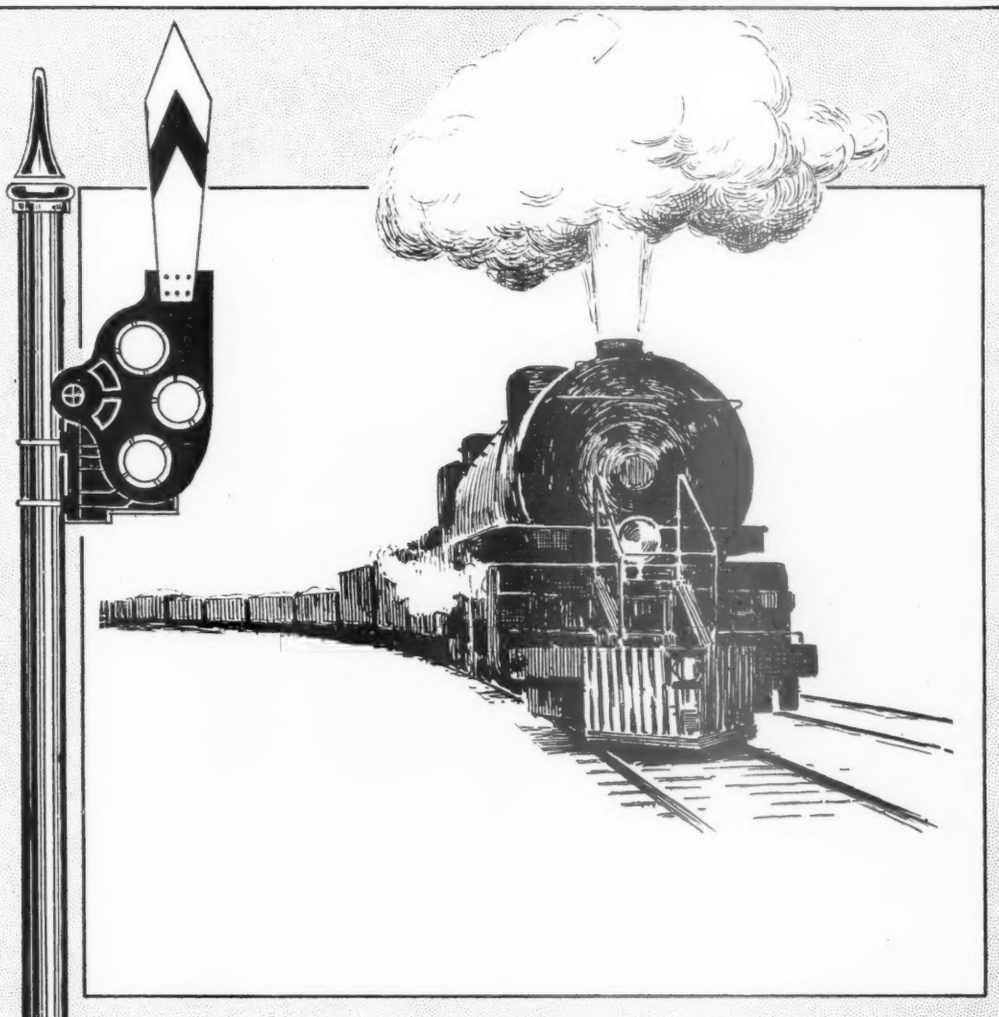
NEW YORK - CHICAGO - WASHINGTON - ST. PAUL - Foreign Offices: LONDON - PARIS - BUENOS AIRES - SHANGHAI.



Go Ahead!

And Carry Our Best Wishes for a Happy and Prosperous New Year.

Haskell & Barker Car Company, Inc.

ESTABLISHED 1852

Office Railway Exchange Chicago, Ill.

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Gould Continuous Platforms and Buffers with steel underframing.
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Gould Slack Adjusters.
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Gould Twin Type of Draft Gears.
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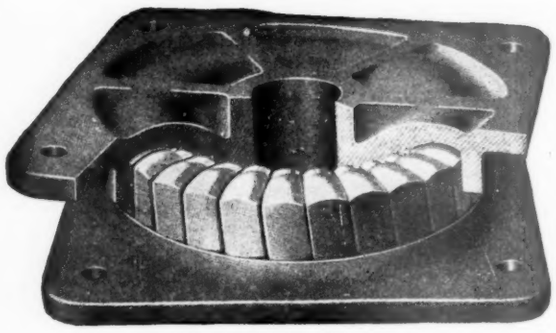
Malleable Iron Castings, scientifically annealed.
Truck Frames.
Cast-Steel Bolsters.
Cast-Steel End Sills.
Steel Castings.
Gould Friction Draft Gear.

Woods' Anti-Friction Side and Center Bearings



Flat Sided Ball
Anti-Friction Center Plate

EDWIN S. WOODS & CO.

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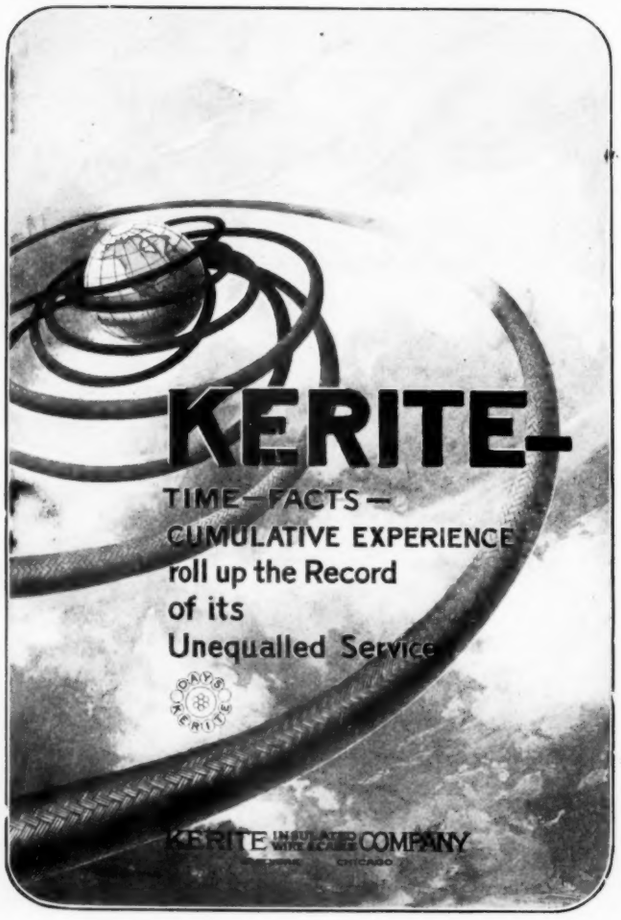


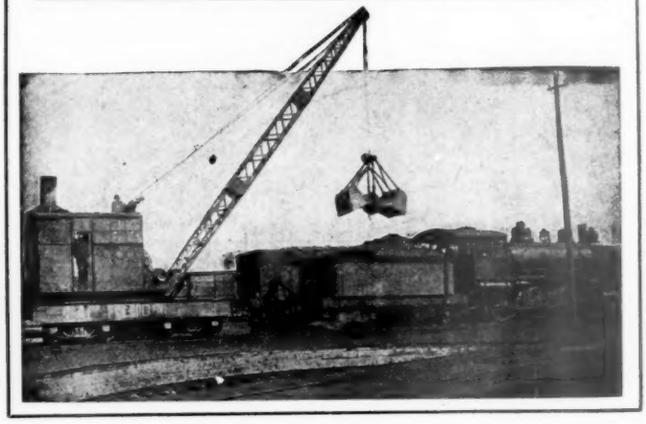
OHIO
Locomotive Crane

Why Purchasers Repeat

It is true that purchasers of Ohio Locomotive Cranes have paid a premium on the first cost—but they find this slight advance is much cheaper than the hundred and one expenses involved for dismantling and buying new parts.

Ohios stand up in service, that is why Ohio Purchasers repeat.

OHIO LOCOMOTIVE CRANE CO.
BUCYRUS Spring Street OHIO



Giant Strain Insulator

made to be neglected

YOU have other things to do than be bothered with replacing broken strain insulators. That's why we make the Giant Strain Insulator so good you can put it in service and forget it.

For instance, we use Mica Discs between metal parts that keep Giant Strain Insulators *insulators* long after the ordinary commercial kinds are scrapped.

And if it's strength plus permanent insulation you're after, let us give you more complete information about the Giant Strain Insulator.

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JOHNS-MANVILLE CO., Ltd.
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JOHNS-MANVILLE SERVICE COVERS THE CONTINENT
And also through—
Asbestos
and its allied products
JOHNS-MANVILLE Serves in Conservation
Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE
ELECTRICAL MATERIALS

SPECIFY THIS MARK

S C M A No. of Mill

TRADE MARK REG. U.S. PAT. OFFICE
ON EVERY TIMBER, BOARD AND BUNDLE of CYPRESS, "The Wood Eternal."

It is your Insurance of true

REPLACEMENT ECONOMY

IT'S THE CONSTANT "LITTLE REPAIRS" THAT BUILD UP EXCESSIVE MAINTENANCE COSTS.

Check up on the cost of the work being done on your line—not the big replacements and new construction work—but just the little jobs—replacing a few rotted cross-arms or a few decayed ties, or a bit of fencing, and you will probably be surprised to find how much these items total in the course of a year.

Of course you can never get away from **all** of this sort of expense, but you can eliminate a surprisingly heavy proportion of it by using

CYPRESS

"THE WOOD ETERNAL"

not only on new construction, but on all replacement work.

All-heart Cypress comes nearest to being "decay proof" of any lumber in the market suitable for railway use.

Several of the largest railway companies in the country have found the use of Cypress a paying investment.

The data that substantiates this fact will be promptly furnished, if you ask for it.

Southern Cypress Mfrs.' Assn.

1254 Perdido Building
New Orleans, La.
or
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MT. VERNON CAR MANUFACTURING CO.

MT. VERNON ILL.

Manufacturers of

FREIGHT CARS

of Every Description

STEEL AND WOOD

Car wheels, Forgings, Pressed Steel Shapes, Brake Beams, Carlines.

Capacity: 10,000 Cars, 150,000 Wheels, 20,000 Tons Forgings, per annum.

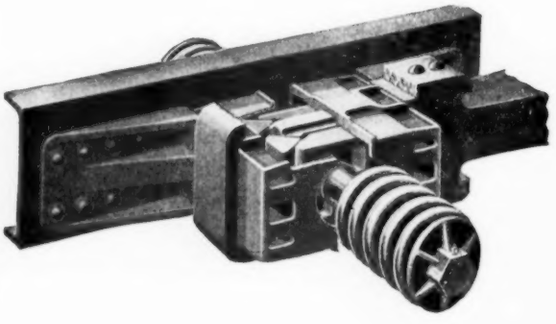
The Youngstown Steel Car Company

Build and Repair Steel Freight Cars

Pressed Steel Parts

Niles, Ohio

Cardwell Friction Draft Gear



Union Draft Gear Company

Chicago Office
McCormick Bldg.

Canadian Office
627 Transportation Bldg., Montreal

The cross-feeding turntable slide is one secret of its success

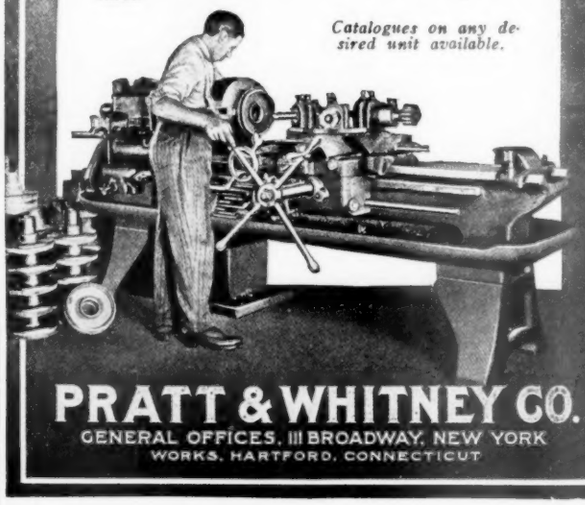
P & W Turntable Lathe

and there are many features on all P & W Machines that make them stand out as leaders in work that requires precision without the sacrifice of production. Pratt & Whitney Small Tools include the line of Staybolt Taps and Washout Taps which are used wherever boilers are made or repaired.

P & W M.C.B. GAGES

are used as final references when accuracy is the issue.

Catalogues on any desired unit available.



PRATT & WHITNEY CO.

GENERAL OFFICES, 111 BROADWAY, NEW YORK
WORKS, HARTFORD, CONNECTICUT

H. H. HEWITT
President

W. H. CROFT
First Vice-President

MAGNUS COMPANY

(INCORPORATED)

Journal Bearings

AND

Brass Engine Castings

New York Chicago

M. C. B. Couplers

We are prepared to furnish the new M. C. B. Standard

TYPE "D" COUPLERS

and also

REGULAR STANDARD

Pitt
Janney X and Penn Couplers

For Freight Cars and Locomotives

Pitt Pivoted Passenger Couplers

Narrow Gauge Couplers in either ¾ size or ½ size designs.

Write for blueprints and prices.

The McConway & Torley Co.
Pittsburgh, Pa.

Ingersoll-Rand Air Compressors

offer higher efficiency, lower upkeep and lower attendance costs than otherwise obtainable.

Bulletins on request.

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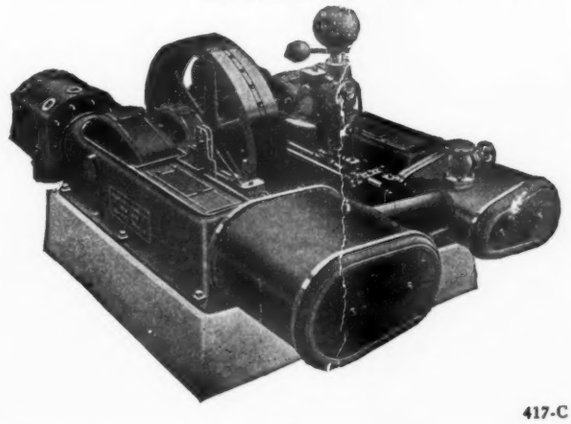
APPLY TO NEAREST OFFICE



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Absolute Right-of-Way Protection

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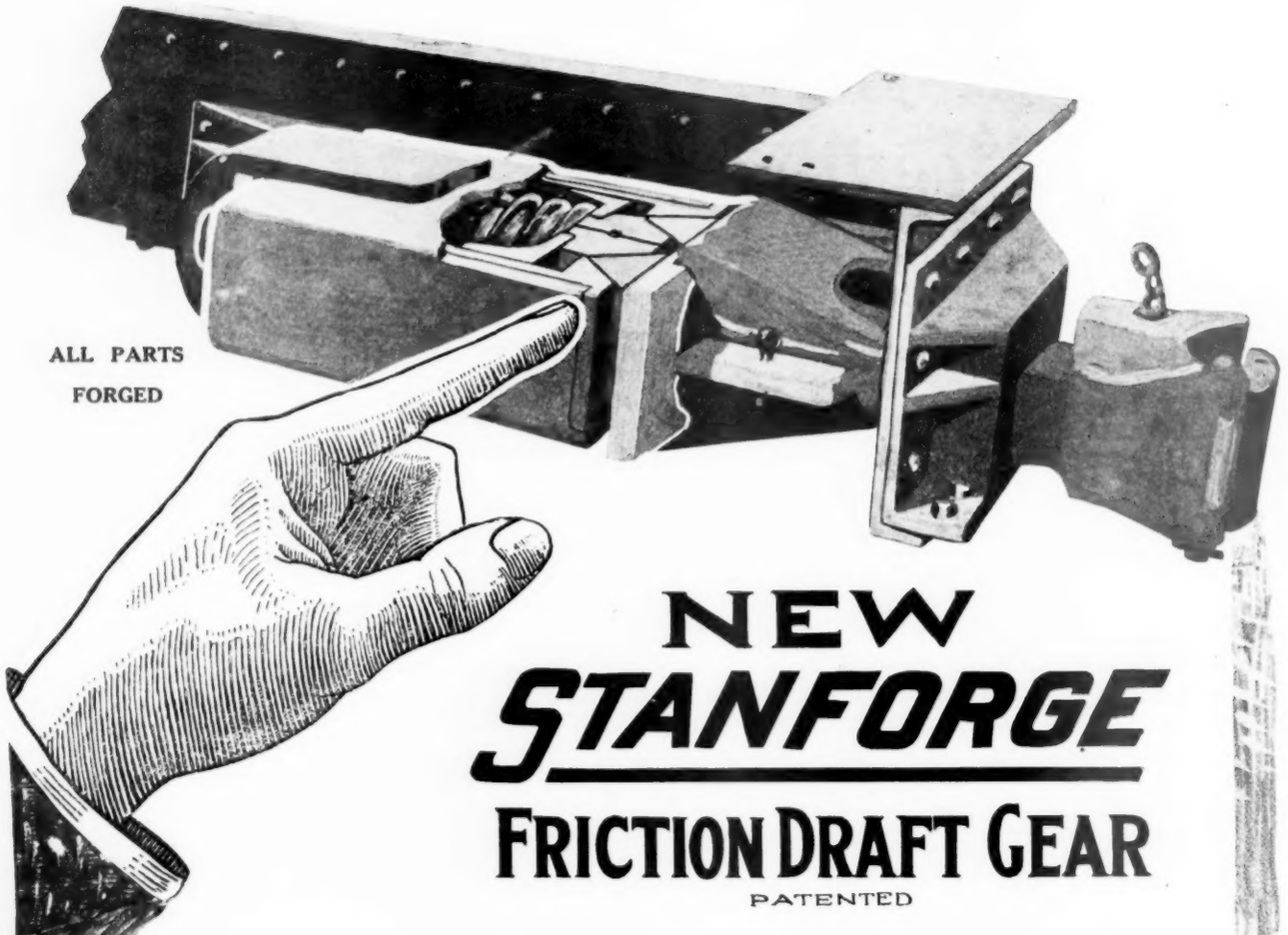

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Friction Blocks and Plates,
High Carbon Open Hearth Steel,
Drop Forged and Heat Treated

Protects Both Car and Lading

Indestructible Under all Conditions of Service

STANDARD FORGINGS COMPANY

BRANCH OFFICES
New York.....2040 Grand Central Terminal
St. Paul.....Merchants Nat'l Bank Bldg.
St. Louis.....Commonwealth Trust Bldg.
Milwaukee.....First National Bank Bldg.
Denver.....1617 Blake Street

Railway Exchange Bldg.
CHICAGO

BRANCH OFFICES
Houghton, Mich.....96 Sheldon St.
Salt Lake City....117 W. Second South St.
PACIFIC COAST REPRESENTATIVE
A. M. CASTLE & CO.
Los Angeles San Francisco
Portland Seattle

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

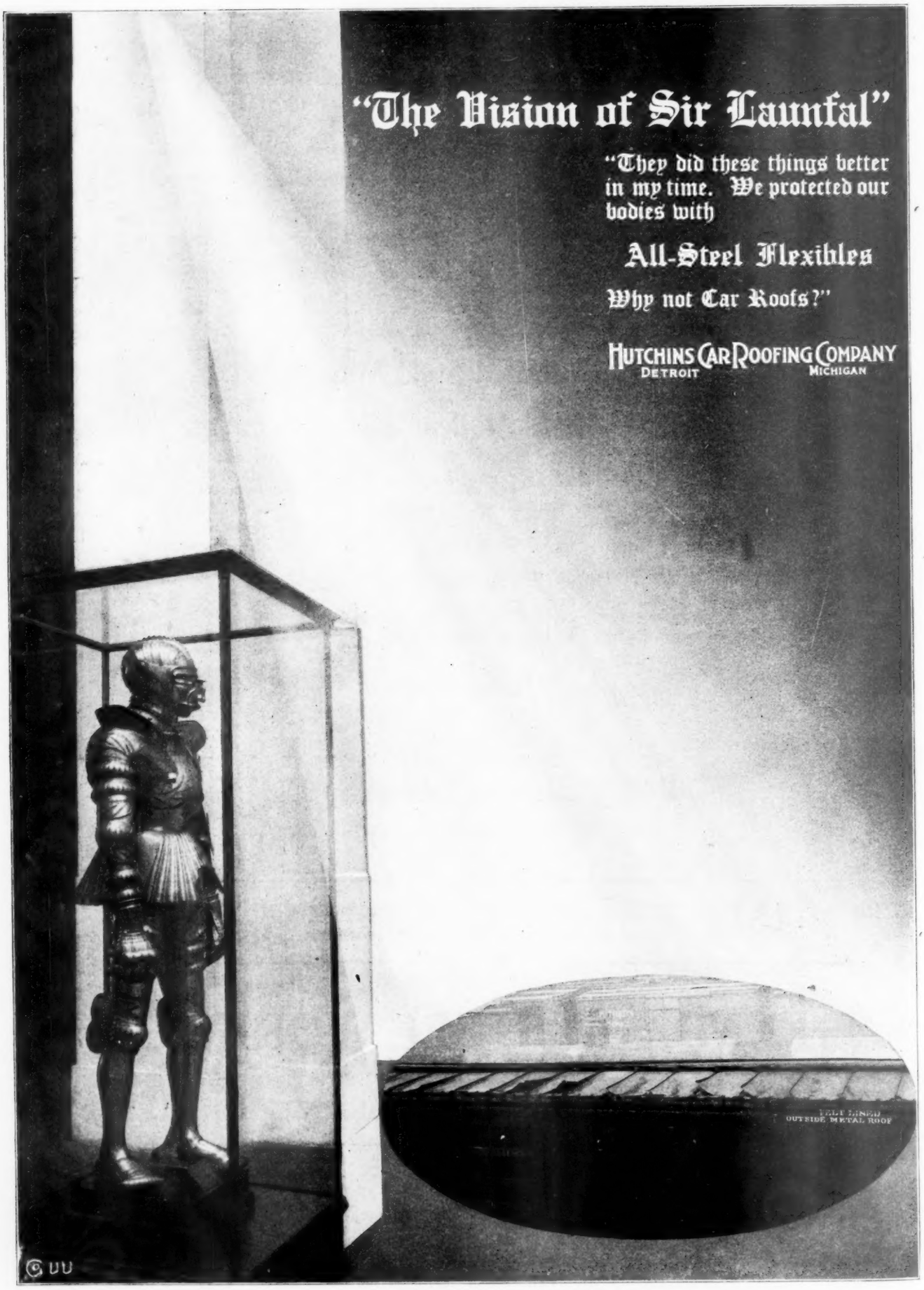
GENERAL OFFICES:

500 NORTH BROAD STREET, PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
HOUSTON, TEXAS

RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.

MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE
PITTSBURGH, PA.


"The Vision of Sir Launfal"
"They did these things better in my time. We protected our bodies with
All-Steel Flexibles
Why not Car Roofs?"
HUTCHINS CAR ROOFING COMPANY
DETROIT MICHIGAN
OUTSIDE METAL ROOF

A WONDERFUL INVESTMENT

What are your older locomotives worth in money today?

There are over 50,000 of them.

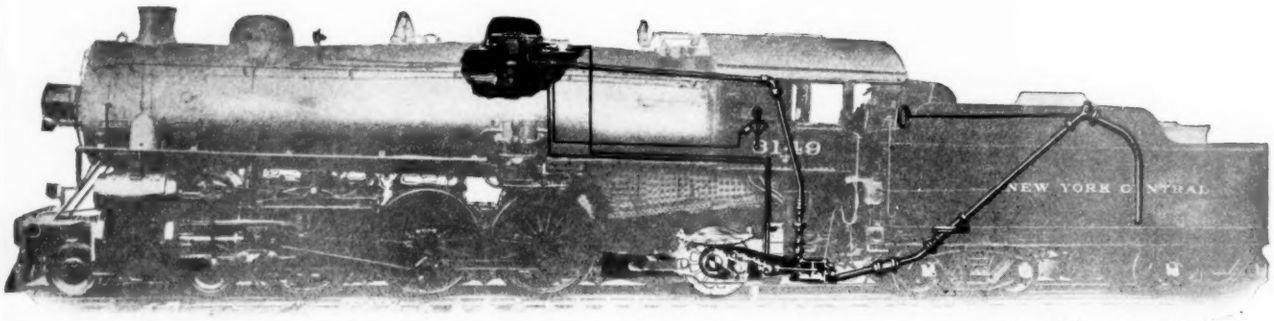
What is money worth today?

Are you getting full value in earnings from all these older engines?

Until all of them are vitalized to get the utmost power from the coal they burn you are NOT getting full value from this great investment.

Feed Water Heaters, Boosters, Brick Arches and Superheaters will return instantly, handsomely and continuously for every application.

G. M. BASFORD CO.



Its use means more ton-miles.

IMPARTIAL JUDGMENT OF AN INDEPENDENT ENGINEER

An important Easterm Railroad made an exhaustive practical test of a freight locomotive equipped with a Booster.

An engineer with international reputation reviewed this test. He has had over a quarter-century of experience in judging locomotive improvements, and he never has said anything that he did not mean.

As to these Booster tests, under date of December 16th he says:

THEY SHOW:

1. "An increase in tonnage from 2100 to 2582 tons, or an increase of 23%.
2. "An increase of tonnage from 1800 tons to 2015 tons, or an increase of 12%, at about 13 miles per hour.
3. "An increase of tractive power at 7½ miles per hour, from 36440 lbs. to 42900 lbs., an increase of 18%.
4. "An increase in tractive power at start with 1958 tons on .86% grade, from 40421 lbs. to 49282 lbs., an increase of 22%.
5. "An increase in tractive power at 13 miles per hour from 34228 lbs. to 38793 lbs. or an increase of 13%.

"These results show that the Booster can be conservatively estimated, under average conditions of freight service, to start a train

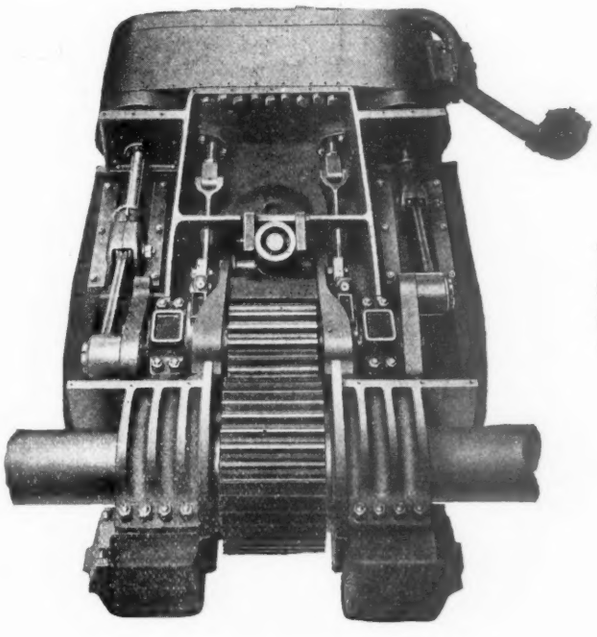
FRANKLIN RAILW

30 CHURCH STREET

about 20% heavier than the same locomotive without a Booster, and that it will accelerate this train to a given speed in a shorter time.

"On larger wheel passenger engines, the proportion in increase of tractive power will probably be somewhat greater, and the use of the Booster will enable an Atlantic type engine to do the work of a Pacific type; and a Pacific type engine to do the work of a Mountain type, as the Booster would only be used in starting the train and accelerating it to speed. After the Booster is disengaged, a locomotive with a smaller number of wheels will keep the train moving with greater efficiency and at higher speeds, because the internal resistance in such an engine is lower than in an engine having a larger number of wheels.

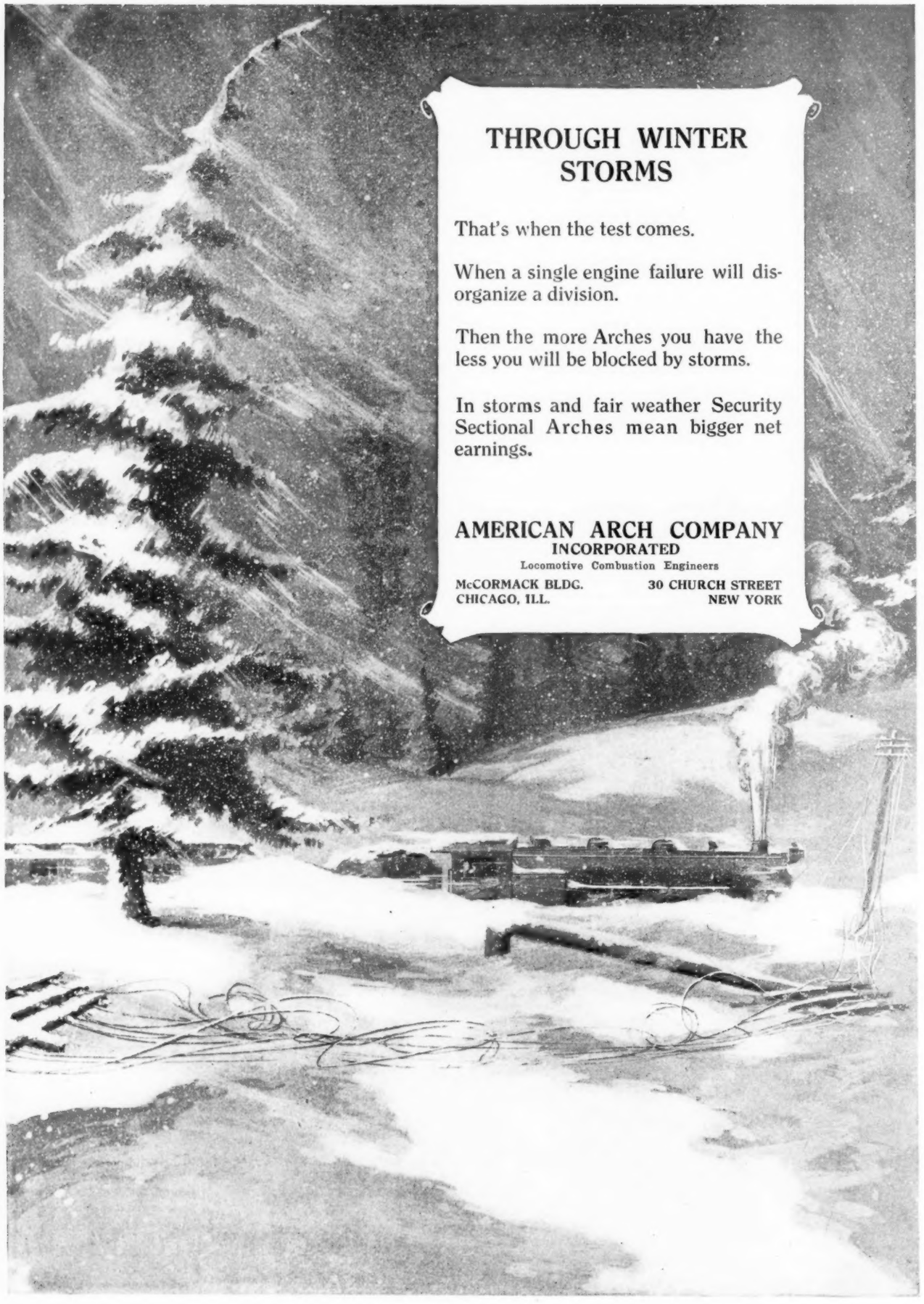
"I believe that this apparatus is destined to meet with great favor and success."

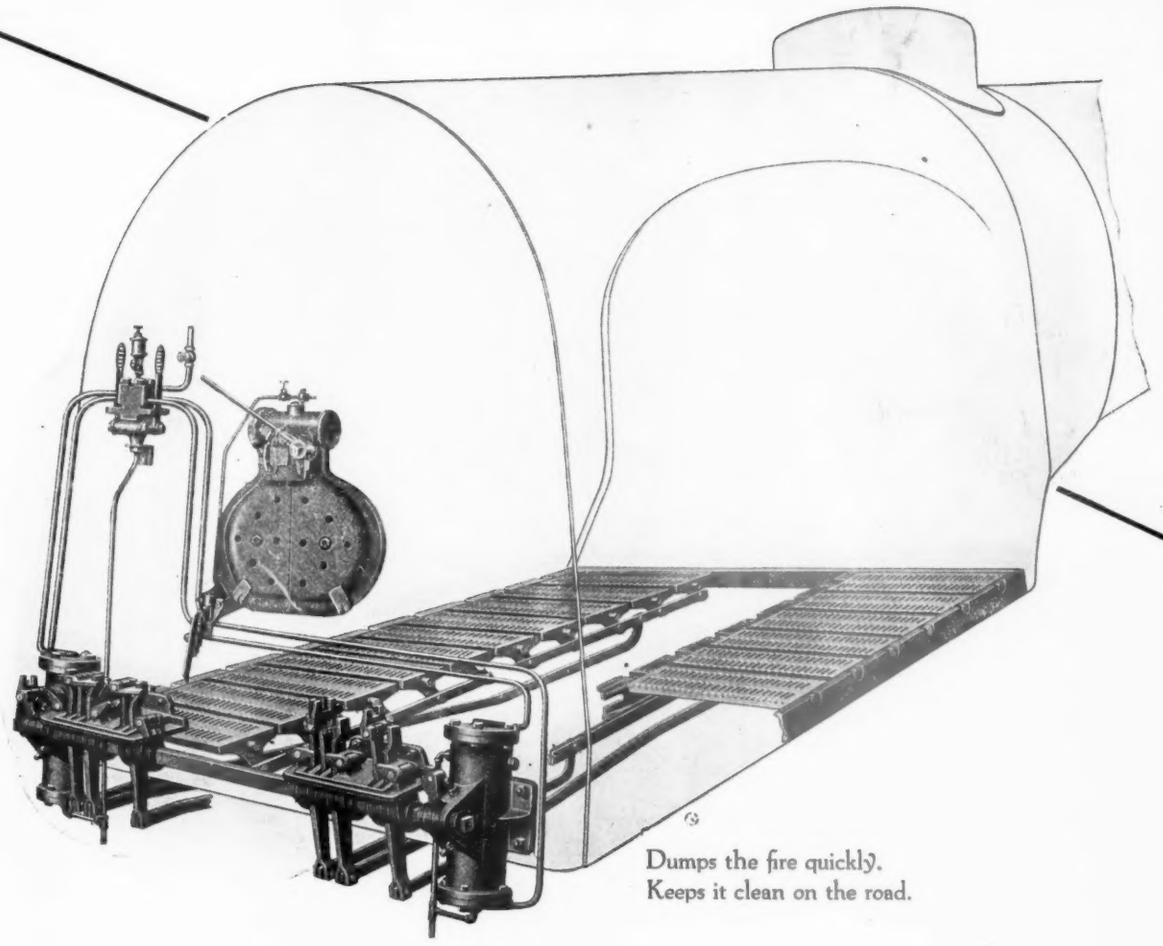


The Booster means increased draw bar pull for all engines with trailing wheels

WAY SUPPLY CO., Inc.

NEW YORK


THROUGH WINTER STORMS
That's when the test comes.
When a single engine failure will disorganize a division.
Then the more Arches you have the less you will be blocked by storms.
In storms and fair weather Security Sectional Arches mean bigger net earnings.
AMERICAN ARCH COMPANY
INCORPORATED
Locomotive Combustion Engineers
McCORMACK BLDG. CHICAGO, ILL.
30 CHURCH STREET NEW YORK



Dumps the fire quickly.
Keeps it clean on the road.

MORE MILEAGE

Speeding engines over the ash pit increases the time available for hauling trains.

Franklin Steam Grate Shakers dump fires by steam power in 5 to 15 minutes.

They avoid the cumulative delay of one engine waiting on another while muscle does the work.

They help keep your power on the road.

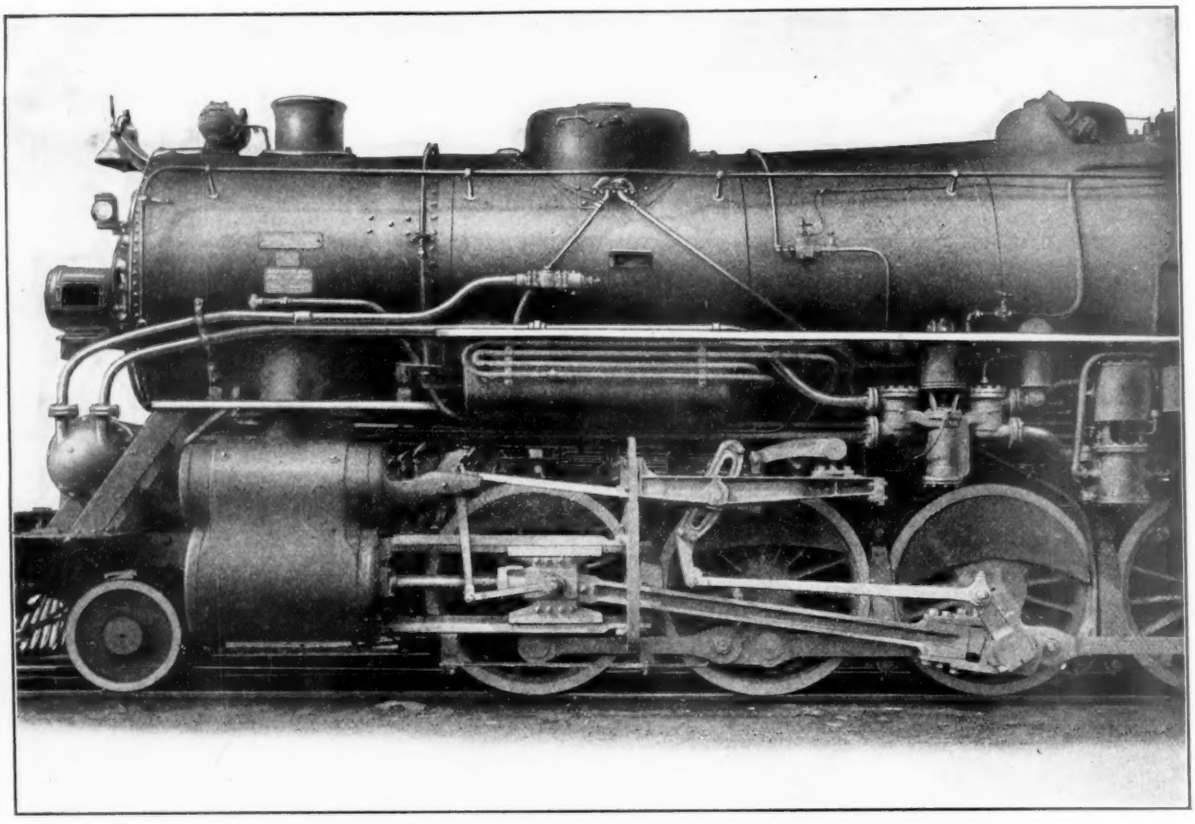
Franklin Railway Supply Company, Inc.

Export Department—International Railway Supply Co.

30 CHURCH STREET NEW YORK

332 So. Michigan Avenue, Chicago, Ill. | 1112 Praetorian Bldg., Dallas, Tex. | 728 Monadnock Bldg., San Francisco, Cal.

Franklin Railway Supply Co. of Canada, Limited, Montreal



Type "E" Feed Water Heater on New Mikado.

FEWER WATER STOPS

In certain sections of the country distance between water stops actually limits the tonnage an engine can haul.

The 1,000 gallons of water an engine turns back to the tender every hour when the type "E" Feed Water Heater is working to capacity has permitted the handling of greater tonnage on such roads and even the skipping of water stops.

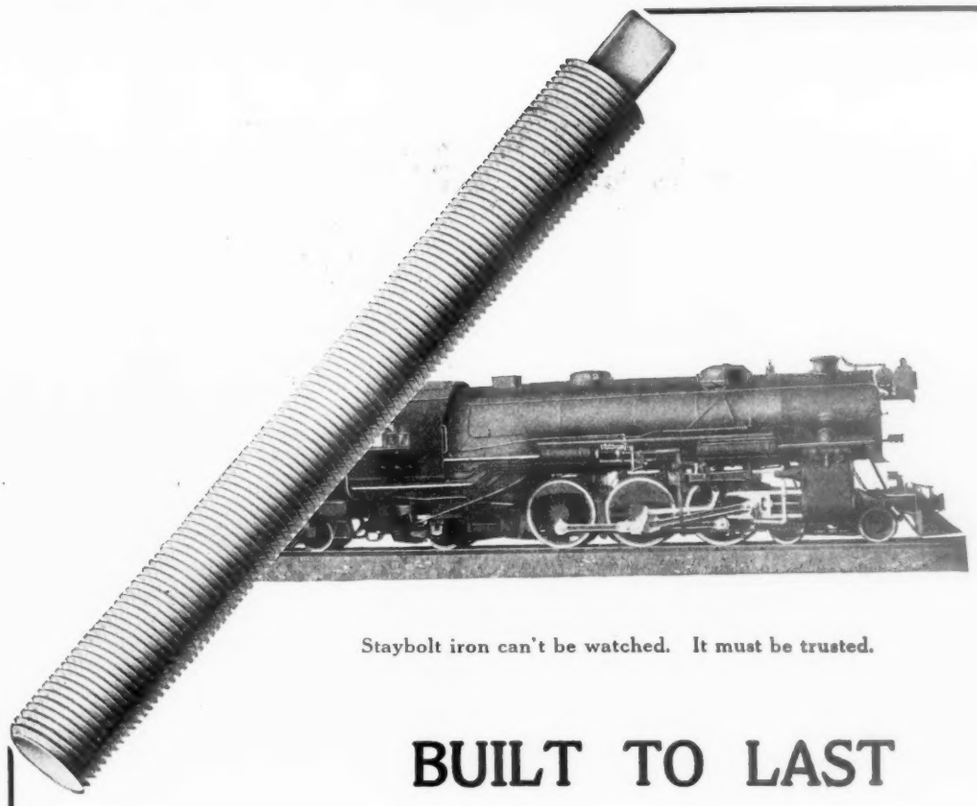
The Chief Executive of such a road said:

"The performance of engine No. 478 equipped with Type "E" Feed Water Heater has been very satisfactory and the performance in regard to skipping water plugs when there was no water to be had and yet bringing the train in was very fine."

At the same time the increased boiler capacity means more tonnage per train.

Locomotive Feed Water Heater Co.

30 Church Street New York



Staybolt iron can't be watched. It must be trusted.

BUILT TO LAST

Staybolt specifications, no matter how written, cannot specify that indeterminate factor — service life.

Inferior irons sometimes pass physical tests.

But only all puddled pig iron, twice made, rolled and rerolled will give the staybolt life which keeps engines in service.

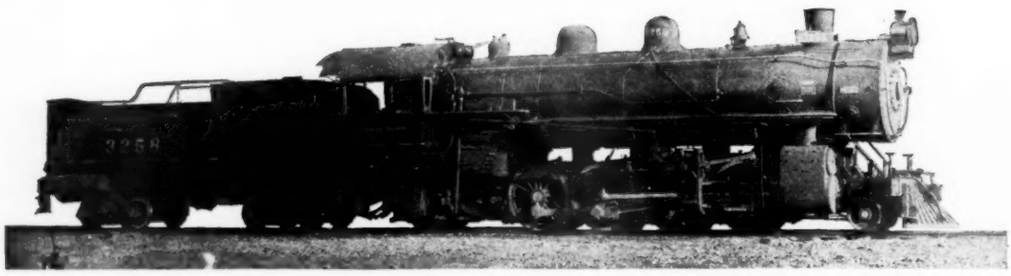
Such an iron is Rome Superior.

Specify it by name.

Rome Iron Mills, Inc.

30 Church St., New York

Works: Rome, N. Y.



DESIGN AND MATERIAL

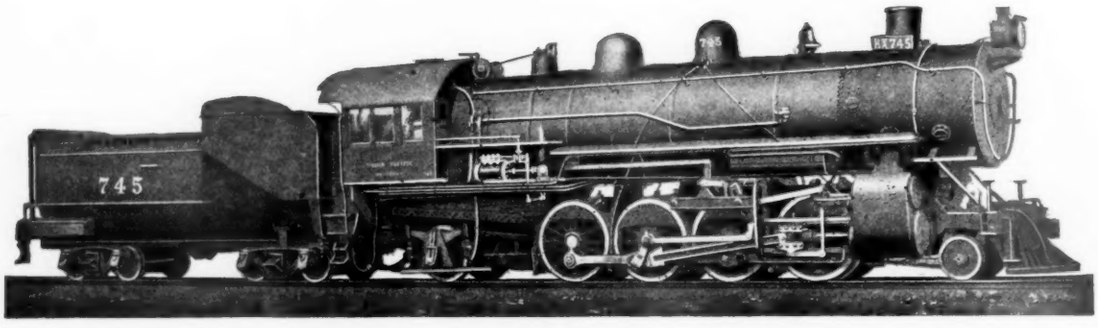
Continuous service demands that all details of the locomotive be properly proportioned and all materials carefully selected.

Lima's engineers have spent lifetimes in this work.

Lima is always ready to co-operate with the railroad company's engineers with a view to producing designs of maximum efficiency for particular services.

Lima Locomotive Works, Incorporated

Lima, Ohio **30 Church Street, N. Y. City**



ANY LOCOMOTIVE WORTH OPERATING IS WORTH SUPERHEATING

All new locomotives and the majority of the locomotives in service are equipped with superheaters.

There are, however, numerous saturated locomotives in operation that are well worth superheating.

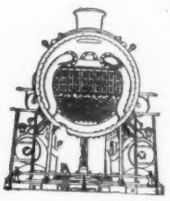
Equipping these old locomotives with our superheaters will effect a saving of millions of dollars a year in locomotive fuel.

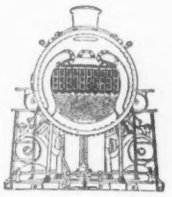
Regardless of the service in which they are used, if these old locomotives are worth operating they are worth superheating.

LOCOMOTIVE SUPERHEATER CO.

General Offices—30 Church St., New York
Montreal—The Superheater Company, Ltd.,
Transportation Bldg.
Chicago—Peoples Gas Bldg.

Designing Engineers and Manufacturers of ELESCO Steam Superheaters and pipe coils for all purposes.





PARKESBURG
Charcoal Iron Boiler Tubes

The Approach of The New Year

It's a time of stock-taking and of inventories of all kinds.

We hope that when you check up, the New Year will find you full of optimism on the future of our Country; your stock of pluck and courage to try new things, high; your supply of common-sense and good judgment sufficient to realize fully the problems that confront us, and your resources of determination and stick-to-it-iveness more than enough to win through to success.

Starting with an inventory like that, 1921 should see some new records in American Railroading.

The Parkesburg Iron Company

Main Office and Works

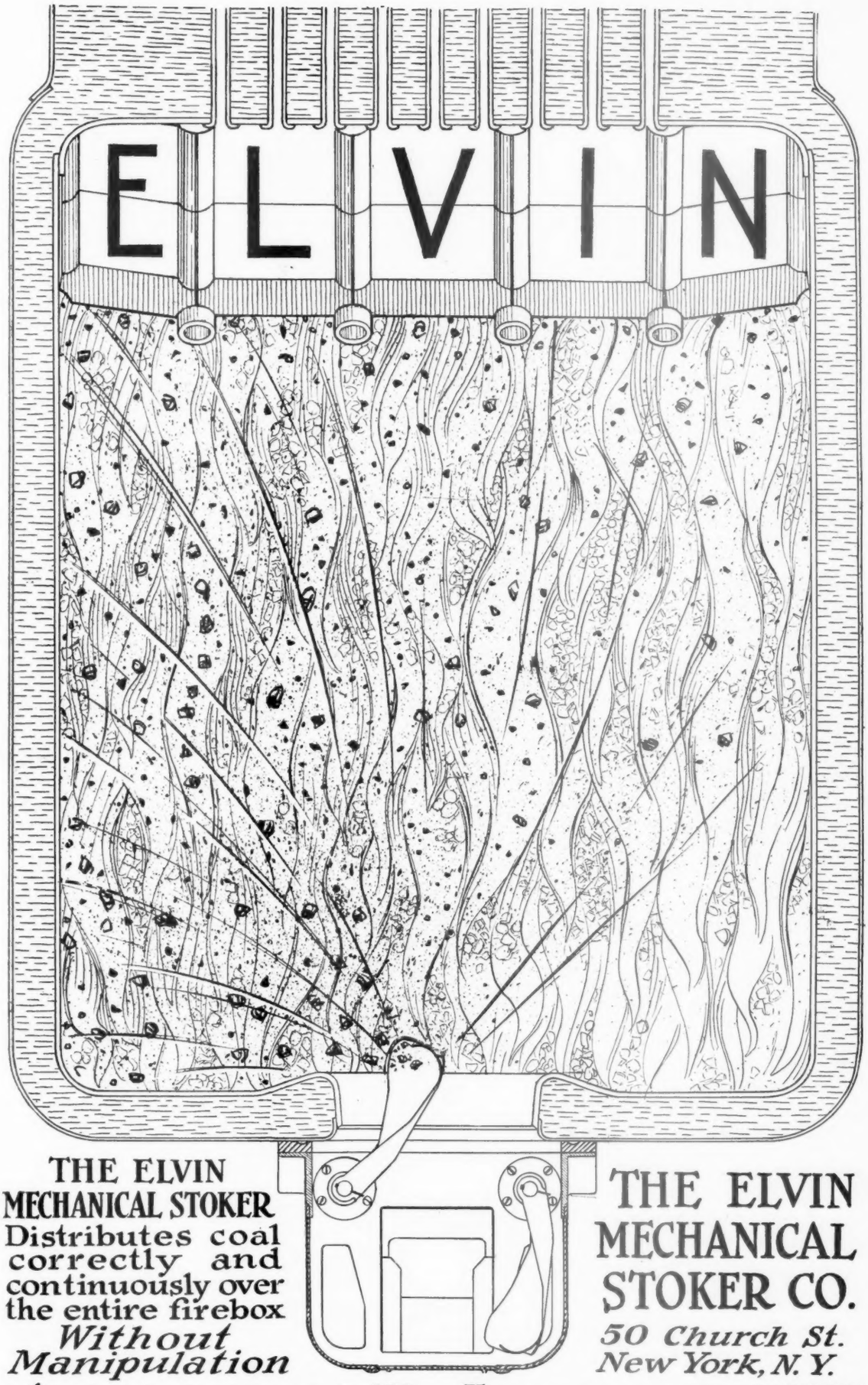
PARKESBURG, PA.

BRANCH OFFICES

New York, 30 Church Street
Chicago, Fisher Building
Philadelphia, Commercial Trust Building
San Francisco, Rialto Building
Boston, Oliver Building
St. Louis, Commonwealth Trust Building
St. Paul, Merchants National Bank Building

EXPORT AGENTS

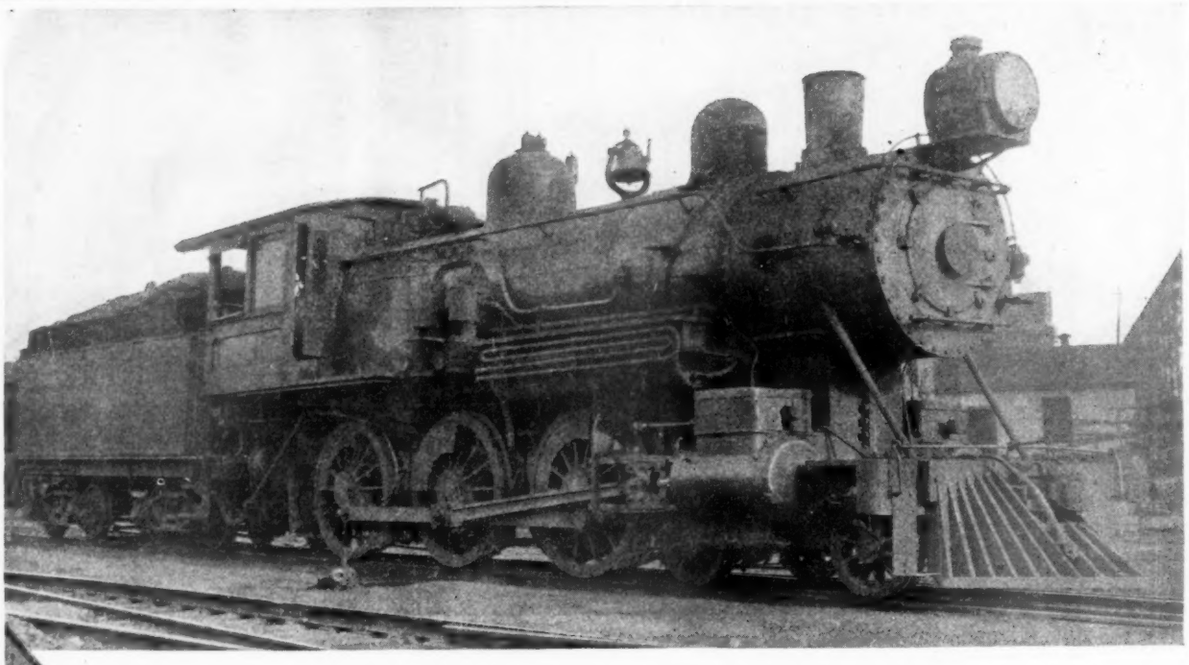
Wonham, Bates & Goode, Trading Corporation, New York

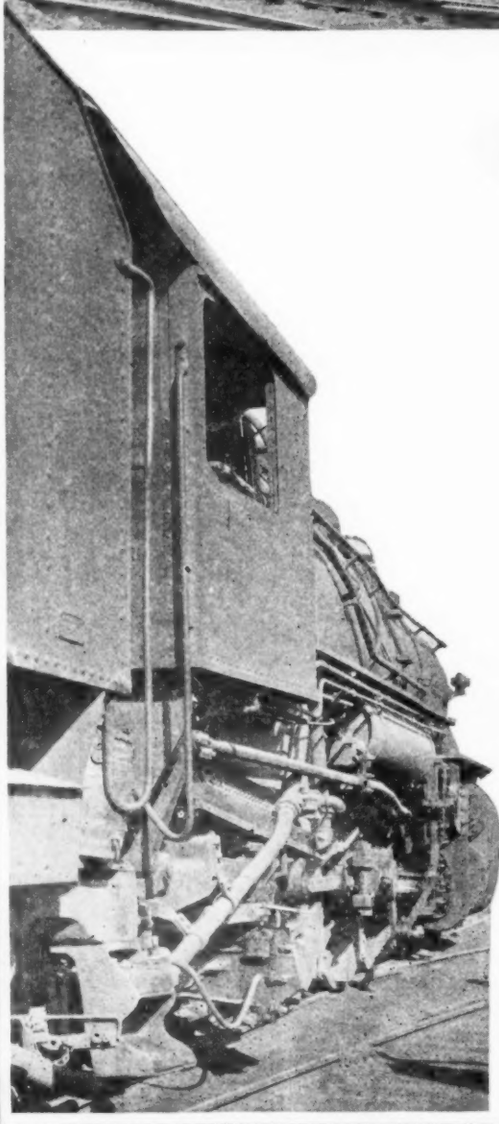


THE ELVIN MECHANICAL STOKER
Distributes coal correctly and continuously over the entire firebox
Without Manipulation

THE ELVIN MECHANICAL STOKER CO.
50 Church St.
New York, N. Y.

ANY HAND FIRING? NO. FUEL ECONOMY? YES





Make Your Old Engines More Efficient

There's a lot of service left in those semi-obsolete engines of yours—fix them up to meet the existing shortage of motive power. Use Hunt-Spiller Gun Iron. Renew the cylinder bushings, valve bushings, packing rings, cross-head gibs, shoes and wedges. Then every pound of steam the boilers generate will WORK—do 100% duty. Another important consideration—these parts will enable the engines to RETAIN their "right-from-the-back-shop" efficiency because Hunt-Spiller resists wear—stands up in use.

"Install Hunt-Spiller Gun Iron at every point of wear" is the prescription that cures your engine ills—***try it.***

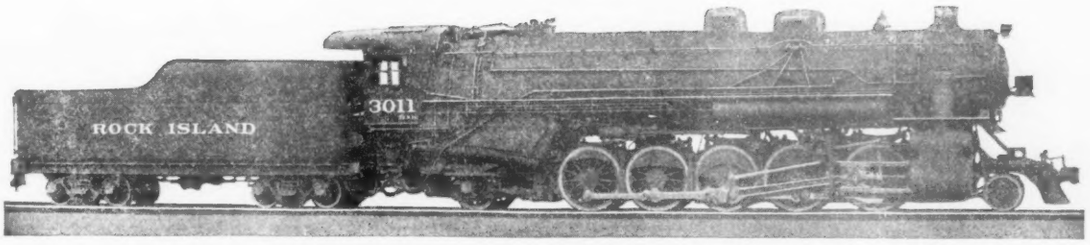
Made Only by

HUNT-SPILLER MFG. CORPORATION

W. B. Leach Pres. & Gen. Mgr. J. G. Platt, Vice-Pres. & Sales Mgr

383 Dorchester Ave. *Office & Works* South Boston, 27, Mass.

"You Pay For What You Need Whether You Buy It Or Not"



BUILT FOR THE CHICAGO, ROCK ISLAND & PACIFIC RAILWAY

SPECIFICATIONS

Total Weight of Engine, 391,000 pounds;

Weight on Drivers, 308,500 pounds;

Diameter of Drivers, 63 inches;

Boiler Pressure, 185 pounds;

Cylinders, 30 x 32 inches;

Maximum Tractive Power, 71,900 pounds.

"Although this is a time for courage, composure and caution, the business skies are practically without clouds. As always, there may be showers from time to time, but there is nothing in the atmosphere to indicate the approach of dangerous storms."

Judge Gary.

These words are not from a man who is exceptionally idealistic, but one who is constructively practical. Executives are realizing as never before, that not only opportunity but public need calls for deeper confidence that will spur progressive action.

With the resumption of business, the railroads must achieve a position of dominance, for this country can only gain as they serve.

NEW LOCOMOTIVES WILL DETERMINE THE ISSUE

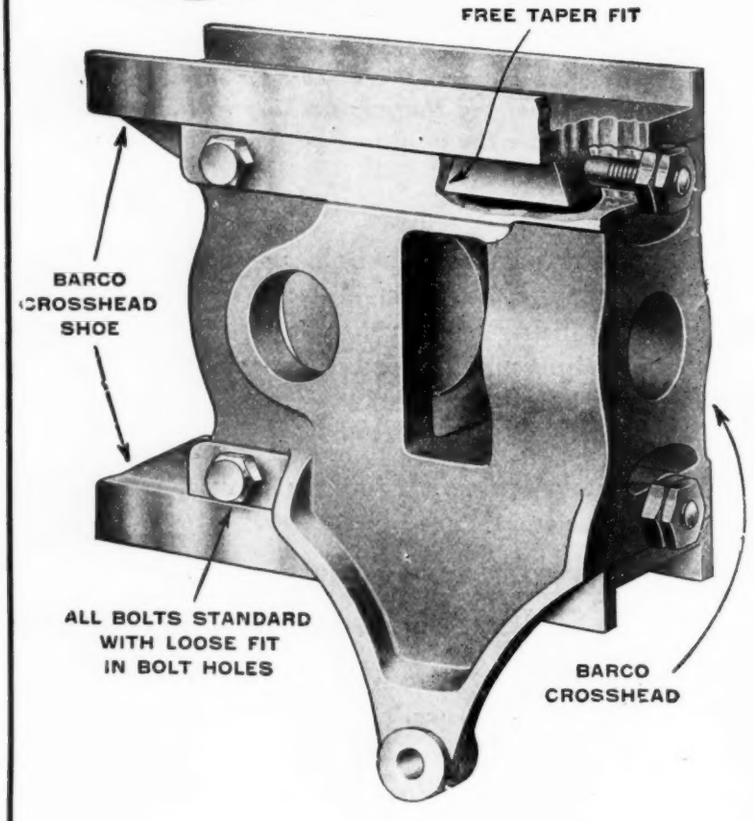
There is a vast difference between buying them now before they are needed—and needing them later before they are bought.

You pay for what you need whether you buy it or not.

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET, NEW YORK

ECONOMY



Time Costs Money

With the present scarcity and high wages of good roundhouse machinists—any device that saves on this item is worthy of your careful consideration.

Barco Crossheads and Crosshead Shoes

can accomplish a big economy of labor on your crosshead repairs—renewing a shoe is only a few minutes' job when the fitting of turned bolts to reamed holes is eliminated. Think of the saving of engine hours too, and you'll see why *your* engines need Barco Crossheads. Our bulletin gives you Barco Facts—send for your copy today.

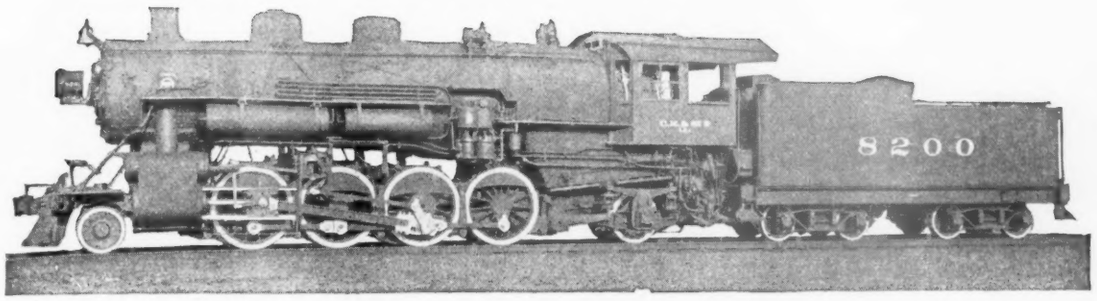
Barco Manufacturing Company

CHICAGO, ILL.

IN CANADA MONTREAL - TORONTO THE HOLDEN CO., LTD., IN CANADA WINNIPEG - VANCOUVER

BALDWIN

54,000



One Hundred Mikado Type Locomotives for the Chicago, Milwaukee & St. Paul Railway

OF particular interest to the railway world at the present time is the order for one hundred of these locomotives now being completed for the Milwaukee System, and the fact that one of them bears the Baldwin Badge Plate No. 54,000.

These engines represent the latest development of a type which has given excellent results on this railway for a number of years.

The general design is in accordance with drawings and specifications furnished by the operating company, with certain approved modifications introduced by the builders.

With sufficient speed for fast freight work, and with the steaming capacity and adhesion needed for sustained heavy hauling, this design is an excellent one for general freight service.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

LOCOMOTIVES

The Natural Thing to Do

Go to

Lukens Steel Company

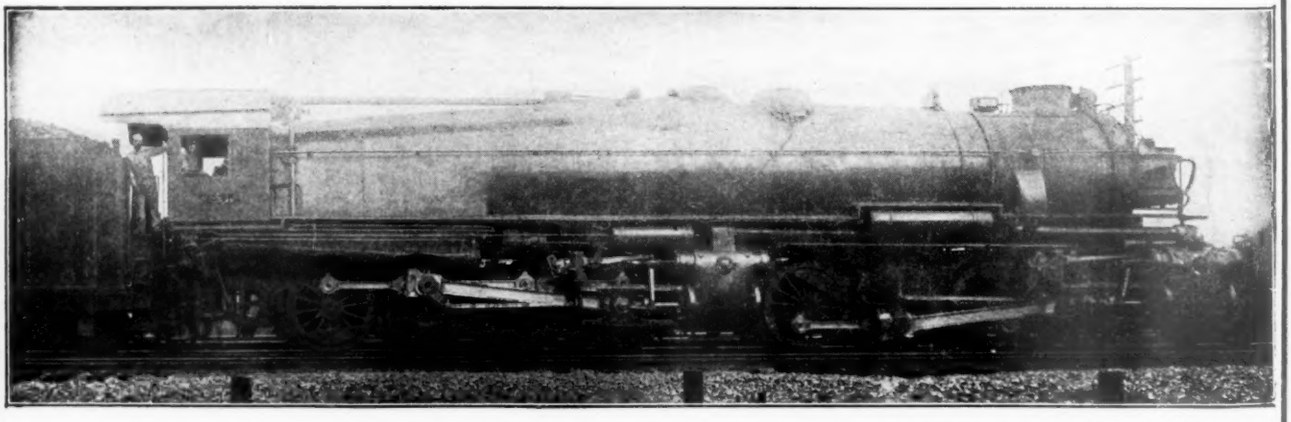
For

Steel Plates

The quality of Lukens Locomotive Firebox and Boiler Steel is established.

The wide plates made in the World's Largest Plate mill are being used in Locomotive Construction.

Over 100 *years experience*



Lukens Steel Company

Coatesville, Pennsylvania

BRANCH OFFICES

PHILADELPHIA NEW YORK BOSTON
BALTIMORE NEW ORLEANS

SELLING AGENCIES

A. M. Castle & Co., Chicago San Francisco Seattle
Los Angeles Rock Island Minneapolis Milwaukee
Detroit Portland
J. F. Corlett & Co., Cleveland Cincinnati

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION 165 BROADWAY, NEW YORK, U.S.A.

6

BAKER VALVE GEAR

BVG

Happy New Year!

If you want to make 1921 a prosperous and happy New Year for your Motive Power department, apply

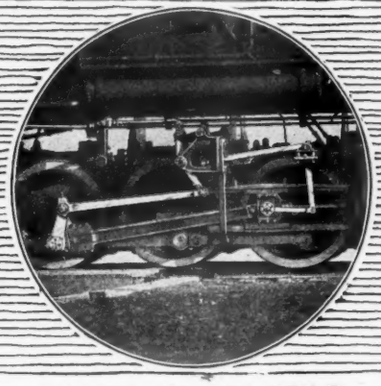
The Baker Valve Gear

to your engines. Then watch your coal and valve gear repair reports for the saving. Count this in with the guaranteed 5% increase in tonnage capacity per locomotive and you'll see why your engines need Baker Valve Gear.

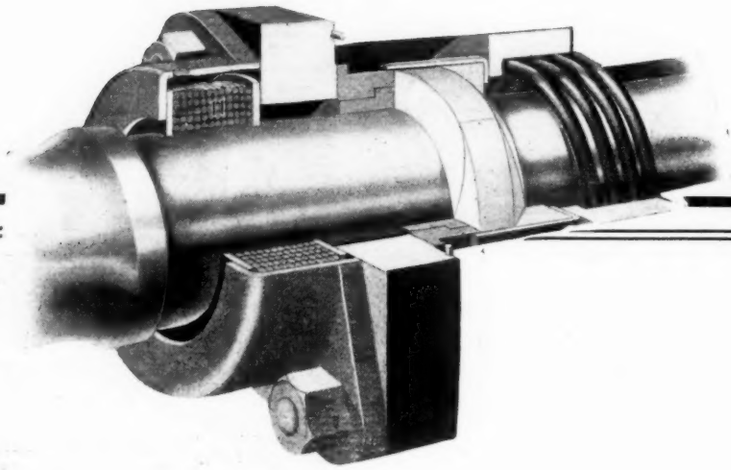
The Time to Apply the Baker Valve Gear Is Now.

THE PILLIOD COMPANY
30 Church Street, New York

Western Representative, Mudge & Co.
Railway Exchange, Chicago, Ill.



BAKER VALVE GEAR
Over 6,500 in Service



Start 1921 Right

With coal prices and labor costs way up, no saving you can effect on these items should be overlooked. Economize on BOTH — equip your engines with

KING METALLIC PACKING

for piston rods, valve stems and air pump rods. Then your engines will burn less coal because the two-part interlocking King Ring cuts out steam wasted by blowing packing. On maintenance, too, King Packing saves you money—roundhouse labor for repair and renewal is cut to a figure that shows a big balance to the credit of the King Ring.

Specify King Packing now—it will pay for itself before next New Year's.

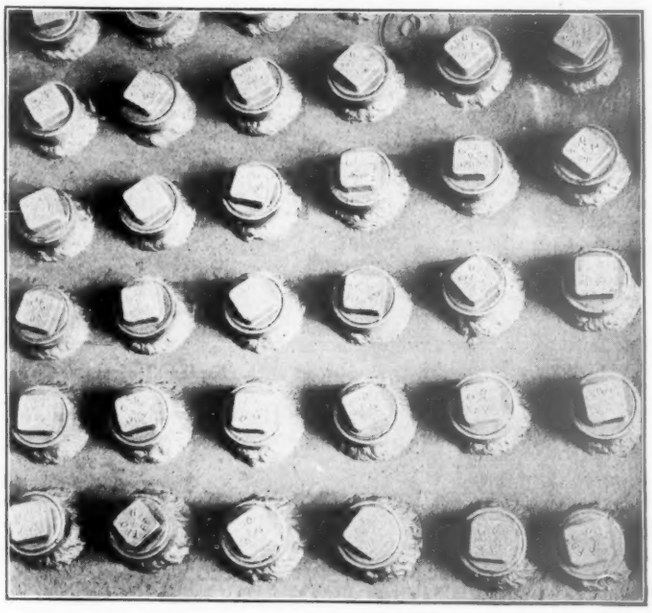
The United States Metallic Packing Company
Philadelphia, Pa.

ABSOLUTELY GUARANTEED

The "F B C" Welded Flexible Staybolt is proving itself in actual service to be the best and strongest flexible staybolt yet designed.

We will guarantee the "F B C" Welded Flexible Staybolt when properly applied—for the life of your firebox.

Threaded sleeves will eventually leak, and crack, due to crystallization and the necessity of manufacturing such from cold rolled screw stock. The welded sleeves are forged and will never break, or leak, when properly applied.



You increase the strength of your boiler sheets, reduce the cost of application and secure much more service from locomotives—when equipped with

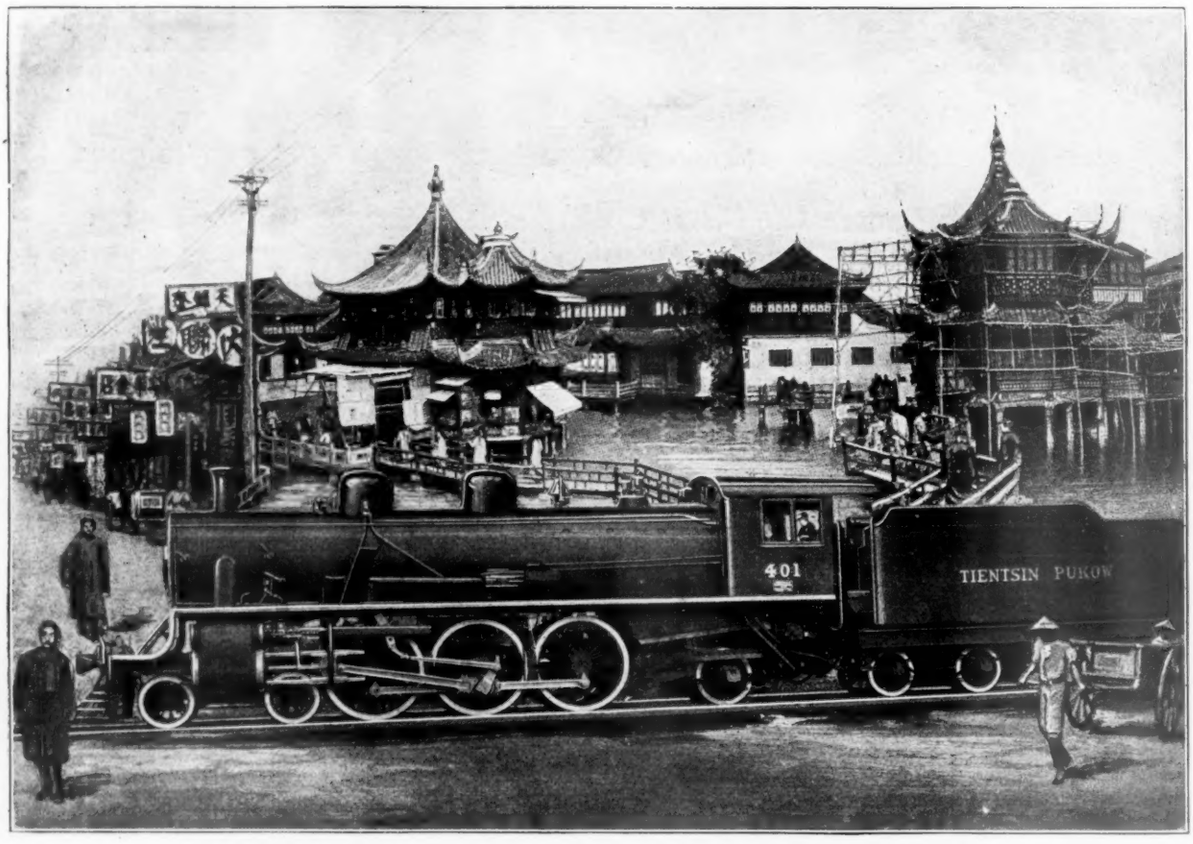
THE "F B C" WELDED FLEXIBLE STAYBOLT

We will be pleased to give you information on the guarantee section — on receipt of your request

FLANNERY BOLT COMPANY

Manufacturers of "F B C" Welded and "Tate" Flexible Staybolts

PITTSBURGH, PA.



Twelve of the above locomotives are fitted with Duplex Stokers. Contrast the primitive vehicle of transportation, the man-cart at the rear of the tender, with the modern Pacific type locomotive prominently in the foreground.

Duplex Stokers in the Orient

Li Hung Chang, the eminent Chinese Statesman, while touring the United States a number of years ago, was so profoundly impressed with the working of a certain railway shop machine tool that he bought one on the spot and took it back to China with him.

Recently a Chinese railroad manager witnessed the operation of a Duplex Stoker on one of our American railways, with the final result that a couple of weeks ago twelve locomotives equipped with the Duplex stokers were shipped to the Tientsin & Pukow R. R., China.

Over 4500 of our Stokers in Service and on Order

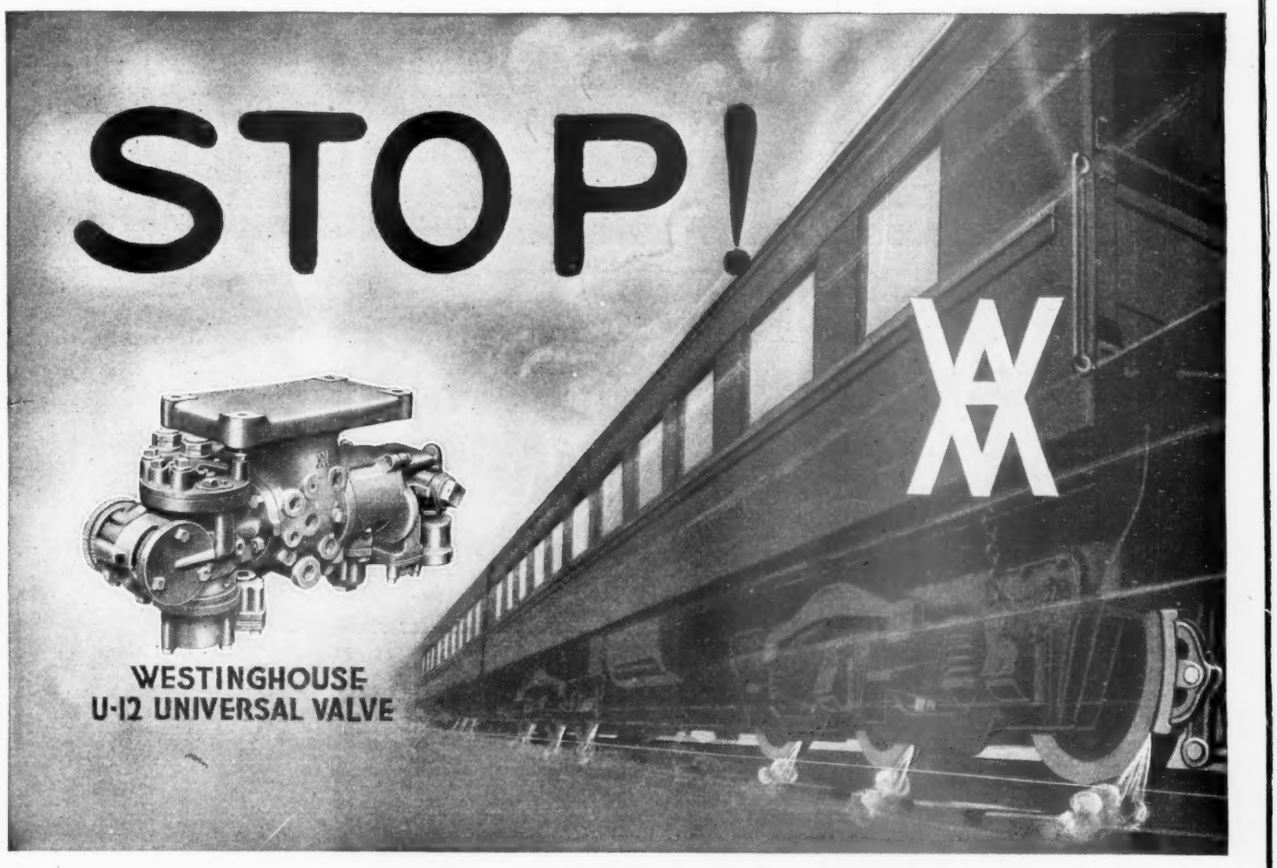
LOCOMOTIVE STOKER COMPANY

Main Office and Works
Pittsburgh, Pa.

MUNSEY BLDG.
WASHINGTON, D. C.

RAILWAY EXCHANGE
CHICAGO, ILL.

50 CHURCH ST.
NEW YORK



Development of a Transportation Element

Westinghouse blazed a broad trail into the wilderness of railroad transportation when, 51 years ago, he invented the Straight Air Brake. At a single stroke he gave to railroads shorter train stops, higher train speeds and safe control of moving trains. Railroads seized these benefits, advanced and expanded.

He and his staff of experts, representing a collective judgment of many years and varied practical experience, developed in a high degree the sagacity and foresight necessary to unfailingly interpret the needs of a growing transportation, and provided at each step of a continuous development the braking requirements of a railroad transportation system now acknowledged to be the best in the world.

Brake Building our Business for a Lifetime

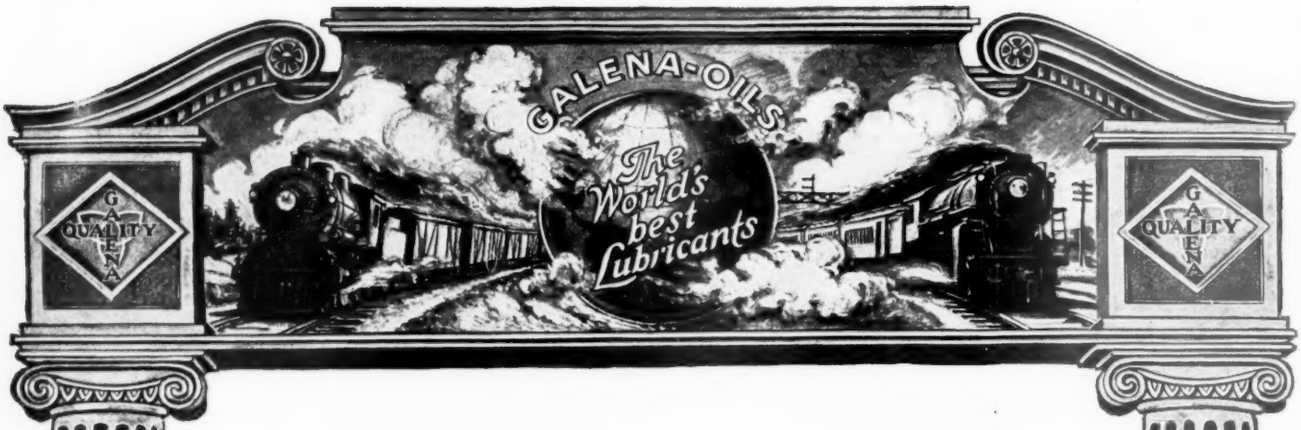
WESTINGHOUSE AIR BRAKE CO.

General Offices, Pittsburgh, Pa.
Works, Wilmerding, Pa.

NEW YORK
SAN FRANCISCO

WASHINGTON, D. C.

CHICAGO
ST. LOUIS



Shall it be your problem or our "problem"?

When GALENA SERVICE is installed, the "lubrication problem" becomes a myth—"there ain't no such animal."

Nevertheless, railway lubrication is indeed a proposition that involves many difficulties, one that is far reaching in effect on safe and efficient operation. GALENA SERVICE assumes the responsibility of securing results that are not only satisfactory, but economical.

GALENA OILS are in service on the great majority of the steam and electric railroads of the United States. Why? For these reasons, because they give the most for the least; because they are time savers, trouble savers, and money savers.

The simplest test of their quality is the mileage test; GALENA OILS give many more miles to the pint than any other grade. But another test, of even greater importance, is shown in their ability to save and preserve bearing surfaces and thereby reduce the items of depreciation and repairs. Both are tests that prove their superiority and furnish the reason that they are known universally as "the world's best railway lubricants."

When Galena Service Goes In
Lubricating Troubles Go Out!

GALENA SERVICE

TRIGRAM G S O C TRADE MARK

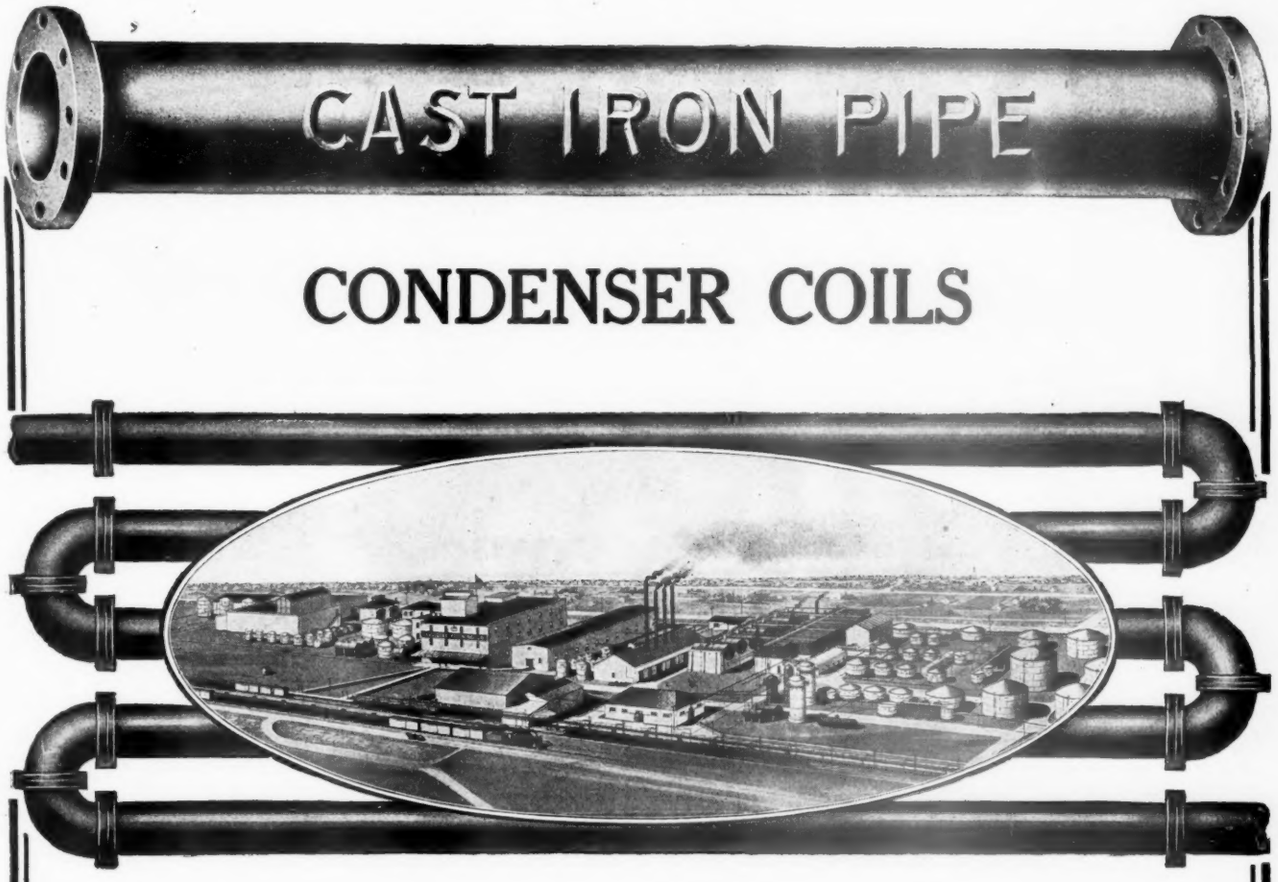
THE GALENA-SIGNAL OIL CO.

NEW YORK FRANKLIN, PA. CHICAGO

Offices in all principal American Cities

LONDON BUENOS AIRES PARIS

TRIGRAM G S O C TRADE MARK



CONDENSER COILS

Crude oil, kerosene, gasolene, naphtha, benzol and tar are most economically and advantageously handled in

Cast Iron Pipe

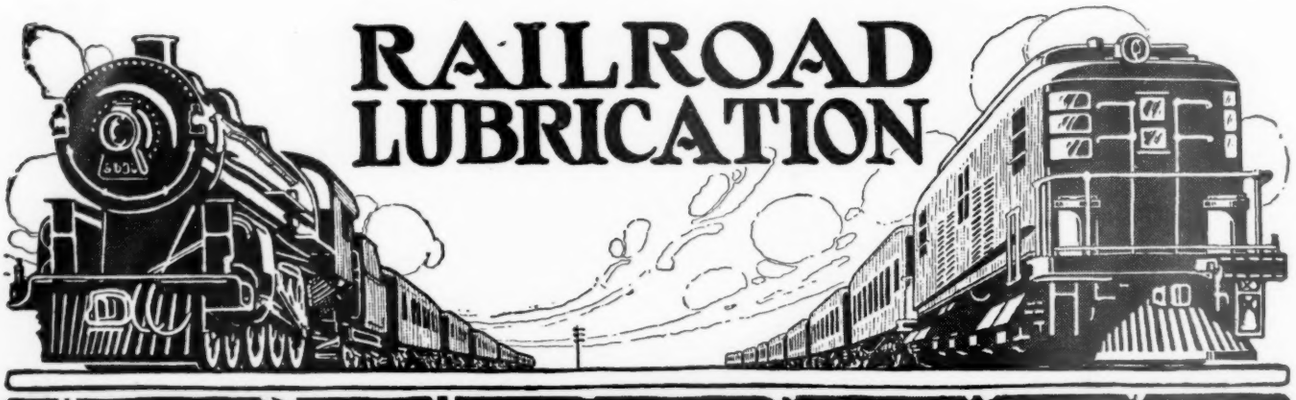
On account of its greater resistance to corrosion and better behavior under high temperatures, Cast Iron Pipe is rapidly replacing rolled metal pipe in the oil refining industry.

THE FIRST CAST IRON PIPE EVER MADE IN THE WORLD'S HISTORY IS STILL IN SERVICE
SERVICE
CAST IRON PIPE
MEASURED BY
CAST IRON PIPE
CENTURIES
MORE THAN 250 YEARS OLD

For condenser and coolers requiring large volumes of water, or for any purpose pipe may be used, Cast Iron Pipe means real economy.

The Cast Iron Pipe Publicity Bureau

1 Broadway New York



RAILROAD LUBRICATION

Guesswork

in the selection of lubricants often leads to costly delays and repairs

Texaco Experts are always careful to recommend the right oil and prescribe a sufficient amount to insure perfect lubrication. The lubricating records of several of the larger roads in this country convincingly testify to the accuracy of their recommendations and the high quality of Texaco Lubricants.

There Is a Texaco Lubricant for Every Purpose

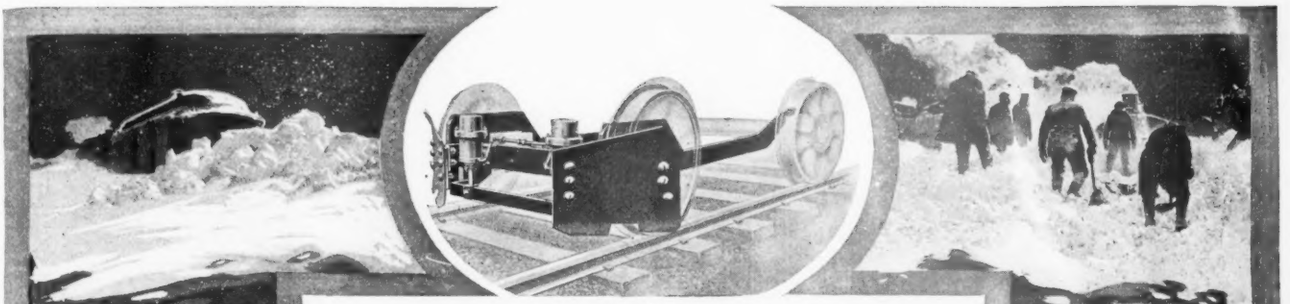
Let us supply you sufficient oils and grease to lubricate one of your locomotives for say thirty days, charging you the yearly contract price for them.

The record of such a test compared with the lubrication you at present get from like equipment will acquaint you with the quality of Texaco Lubricants and the economy and efficiency effected by their continued use.

Our nearest office is ready to handle your inquiry

THE TEXAS COMPANY
RAILWAY SALES DEPARTMENT
NEW YORK: Whitehall Building
CHICAGO: McCormick Building
HOUSTON: The Texas Company Building
ATLANTA: Healy Building

There is a Texaco Lubricant for Every Purpose

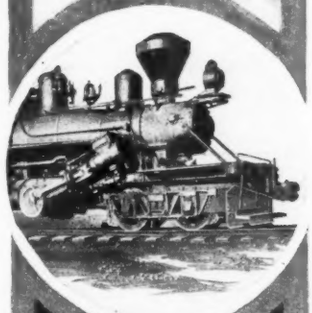


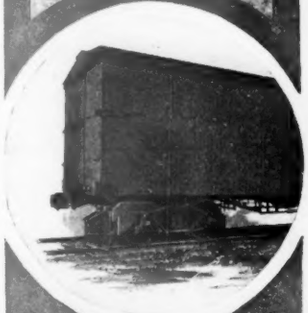
Does The Winter Look Like This To You?

One Storm On Top Of Another

So far the prospects for an open winter look fine. No Snow—little cold weather, trains on time, and in general a winter ideal for railroading —Everybody's happy.

But strange to say the winter during which the accompanying illustrations were taken started the same way and in January and February literally changed its mind and dropped one storm on top of another so fast that the unprepared divisions staggered under their enormous handicap (of under equipment) and found themselves closed. Trains blocked—extra labor—and money in the hole. There's only one way to be happy—*Be prepared*—Equip your division now with ample equipment to ward off the coming snow storms.





Ray Snow Plows and Flangers

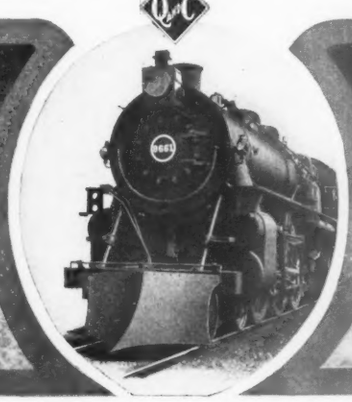
will afford you positive protection. A perfect flanger operated from the cab by air pressure—various types of plows made for any type of car.

Information and prices gladly given on request.

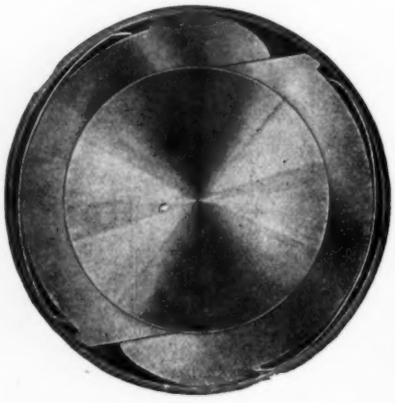
The Q AND C Co.,
90 WEST STREET,
New York

Railway Exchange Bldg., ST LOUIS

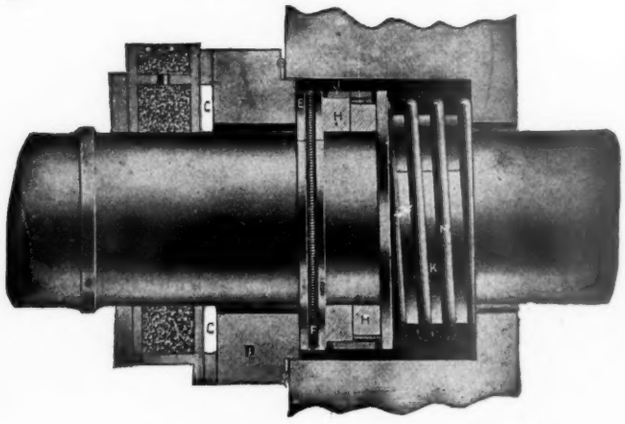
Peoples Gas Bldg. CHICAGO



"The Packing That Packs"



Sectional Piston Rod Packing



We agree to make the following Guarantee Contract with any Railroad in the United States

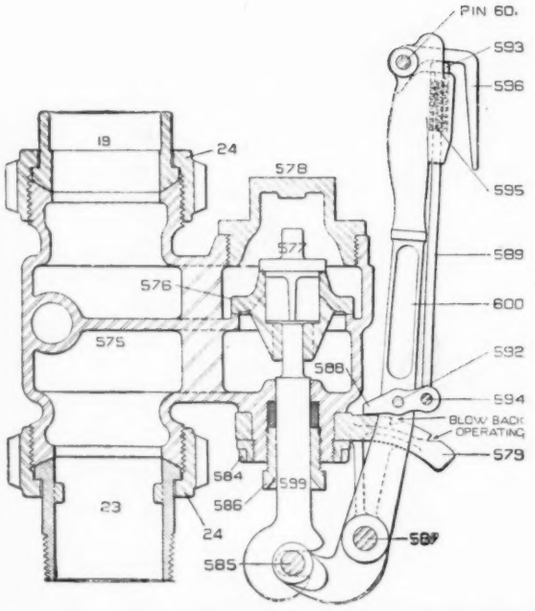
"In specifying Paxton-Mitchell Metallic Packing for new locomotives or changing old ones over we guarantee that if when the engine so equipped goes through the shop for the first overhauling, we have not demonstrated to the mechanical officials of the railroad that Paxton-Mitchell Metallic Packing is superior to any other packing in service on their road, we will at your request replace the packing you were originally using free of cost to your Company."

THE PAXTON-MITCHELL COMPANY **Omaha, Nebraska, U. S. A.**

Paxton-Mitchell, Limited, Canada. Represented by The International Mach. & Supply Co., Ltd., 421 St. James St., Montreal, Quebec

William Sellers & Co. Incorp.

PHILADEPLHIA, PA.



PATENTED, IMPROVED

Balanced Lever

STARTING VALVE

STYLE V C (VERTICAL CHECK)

The only type of valve for NON-LIFTING Injectors which will remain tight in service—Valves can be ground without removing lever or attachments.

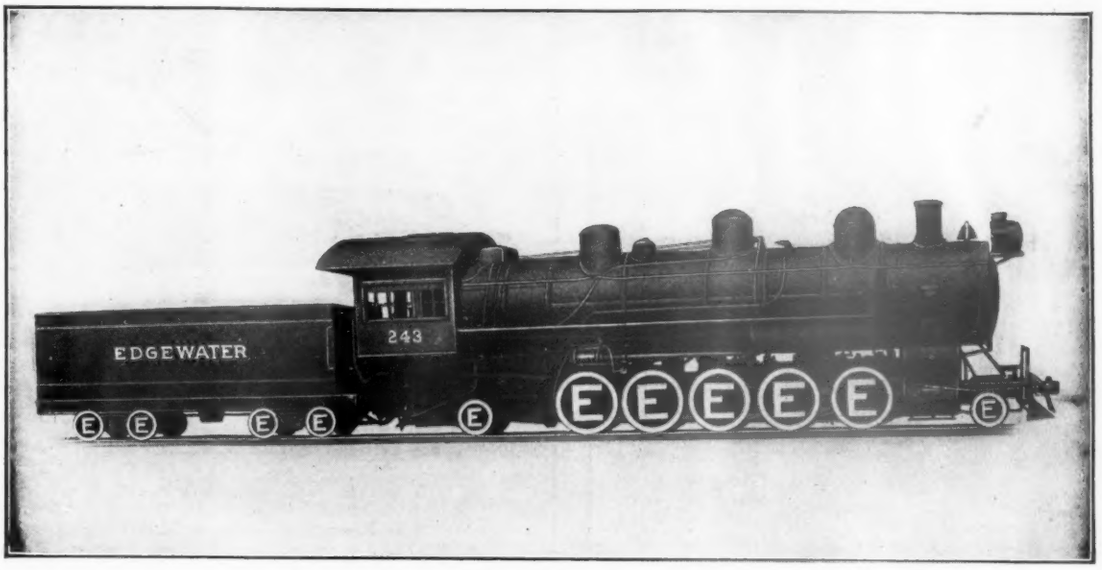
Can be used as a heater without danger of burning hose or wearing seat of valve.

May be swiveled to any desired angle.

Can be arranged for inside or outside of cab.

Valve cannot jar open.

LABOR SAVING MACHINE TOOLS, SHAFTING, ETC.



EDGEWATER STEEL COMPANY

Locomotive Tires
Car Wheel Tires

PITTSBURGH, PA.

Steel Tired Wheels
Rolled Steel Wheels

Sales Offices:

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Finance Building, Philadelphia
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Starks Building, Louisville, Ky.
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Kearns Building, Salt Lake City
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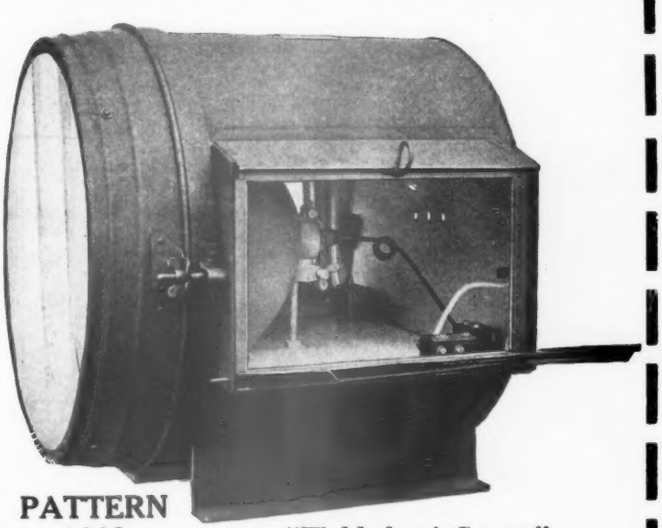
SUNBEAM

Electric Headlights and Turbo-Generators

—Efficient, economical, dependable.

Standard on many large roads—eventually the standard on others.

A trial installation soon proves the merits of the "Sunbeam."



PATTERN 1018

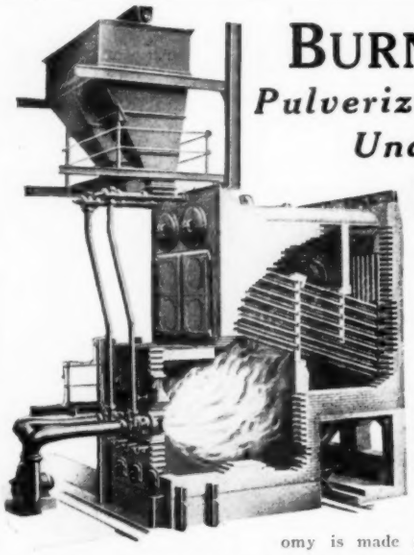
"Welded, of Course"

SUNBEAM ELECTRIC MANUFACTURING CO.

(Formerly Schroeder Headlight and Generator Co.)

America's Foremost Headlight Builders for 36 Years

EVANSVILLE, INDIANA, U. S. A.
NEW YORK RICHMOND, VA. ST. LOUIS CHICAGO SAN FRANCISCO



BURNING
Pulverized Coal Under
Babcock Wilcox Boiler

Firing pulverized coal efficiently under stationary boilers—to give highest possible evaporation and carbon dioxide percentage with best fuel economy is made possible by using

FULLER-LEHIGH PULVERIZED COAL EQUIPMENT

With this equipment you can operate your boilers continuously at high efficiency and at the same time burn cheap grades of coal.
If you are interested in cutting your fuel costs, write us.

FULLER-LEHIGH COMPANY

Main Office and Works, Fullerton, Pa., U. S. A.

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Hamburg 1—"Wallhof"—Glockengiesserwall 2 Germany.
Brussels, Belgium, 101 Boulevard, Adolphe Max.

Just one suggestion for the new year. When culverts are needed, install good ones. Put in

ACME (NESTABLE) Anti-Corrosive Galvanized Corrugated CULVERTS

and you may count that act as one well done. For "ACMES" are dependable—they are lasting. It is a matter of record that those installed over twelve years ago are still in good condition. Made of NO-CO-RO they resist rust. You can always bank on "ACMES."

The Canton Culvert & Silo Co., Canton, O.
Founders of the Nestable Culvert Industry

This Book will help you in your daily work. It contains the latest amendments and rulings on the Standard Safety Appliances for all Cars and Locomotives. It shows the correct legal application with the law preceding each cut.

This 7th Edition has been approved by The Master Car Builders' Association and should be in the hands of every Superintendent of Motive Power, Master Mechanic, Car Foreman, Inspector and Repairman.

Bound in leather, $2.00 per copy
Bound in heavy cover paper, reinforced with cloth, $1.00

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Send orders to Garrett & Massie, Inc., Selling Agents
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KELLER-MASTER

KELLER-MADE MASTER-BUILT

The Latest Achievements

—in the development of the Pneumatic tool industry of the world are represented in "Keller-Master"

Riveting Hammers **Rivet Busters**
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ACCESSORIES

Complete Catalog on Request

KELLER
PNEUMATIC TOOL COMPANY
GRAND HAVEN, MICHIGAN
BRANCHES EVERYWHERE

Dearborn Treatment

will accomplish a fuel saving of from eight to fifteen per cent, because it keeps the heating surfaces of the boilers free from scale, and assures the quick transfer of heat units from fire to water.

1/16 inch scale formation causes a heat loss of more than 12%. Any boiler using scale-forming water will have from 1/16 to 1/8 inch of scale on its flues unless some method of scale prevention is used.

The many roads that have utilized Dearborn Service for the past 15 years know its great value in locomotive operation. The waters are analyzed, and treatment furnished to correct their scale forming, corrosive, or foaming tendencies. The boiler surfaces are kept free from scale, the boilers steam freely, foaming does not develop, greater mileage is obtainable between boiler washings, and there are no failures chargeable to water conditions. Vast savings in fuel result, in addition to the saving in boiler repairs, and increased life of flues and fireboxes.

The cost per thousand gallons to treat the water by Dearborn methods is lower than by any other system, *and results are assured.*

DEARBORN CHEMICAL COMPANY
332 South Michigan Avenue CHICAGO

Let Us Help You Solve All Problems Connected With Oil Storage and Delivery in Shops or on the Line

We are now rendering an appreciated service to leading trunk lines, in taking care of their oil storage and dispensing problems, in an effective and efficient manner.

QUALITY TOKHEIM

pumps, tanks, storage and dispensing systems, for gasoline, kerosene, signal oil, lubricating oil, paint oil, cutting oils and compounds, are admirably adapted to Railroad Service both in shop and round houses, and out on the line.

Send for our Industrial Bulletin.

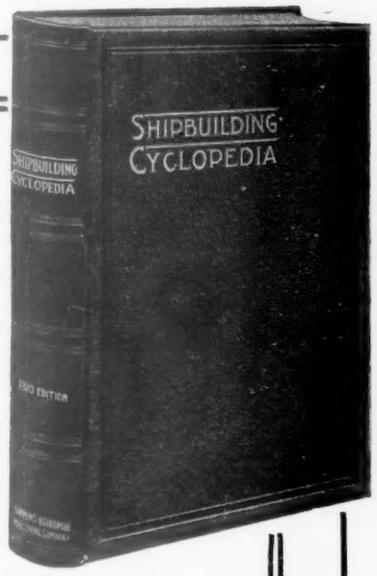
TOKHEIM OIL TANK & PUMP COMPANY
1656 Wabash Ave., Ft. Wayne, Indiana

"A Book of Prime Importance These Days"

HERE is what Mr. P. H. W. Ross, President, The National Marine League of the United States of America, states concerning the

SHIPBUILDING CYCLOPEDIA

"I want to tell you that I think this is one of the most magnificent publications I have ever seen, and it is an immense help to the maritime development of our country. I was positively amazed at the wealth of information contained in its pages, and I want to congratulate you very sincerely on something that is in my opinion of prime importance in these days when our people have so much to learn in the business and art of shipbuilding and ship operation."



This book consists of 1,119 pages 8 in. x 11½ in. and covers: Definitions of Shipbuilding Terms, Basic Design, Hull Specifications, Planning and Estimating, Ship's Rigging and Cargo Handling Gear, Tables of Displacement of Commodities, Arrangement and Working Drawings of Modern Vessels, and a Composite Catalog of Marine Equipment.

Price in Buckram $10.00; in leather $15.00

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The House of Transportation
If it's on transportation we can supply it.
Woolworth Building **New York**

Classified Advertisements—Help and Situations Wanted advertisements appearing in the "Get Together Department," 5c. a word an insertion, including eleven words for address. Minimum charge $1.00 for each insertion. For Sale advertisements, $3.00 a column inch (1⅝" wide). Any number of inches may be used. Copy must be in this office by Saturday noon to insure insertion in the following week's issue.

POSITION WANTED

SITUATION wanted by active young executive, age 38, formerly assistant to President, large refrigerator car line, also Supt. Transportation same line for several years. Later served as President and General Manager smaller car line. Good general knowledge railroading, both operating and traffic. Highest references. Desire connection in west if possible. Address Box 206, Railway Age, Woolworth Bldg., New York, N. Y.

ARA Rule man of seventeen years' experience desires change. At present Chief ARA Bill Clerk of one of the largest coal carrying roads in the east. Can handle to conclusion all matters with foreign lines pertaining to Section 3 ARA Rules. Reference furnished. Address Box 199, Railway Age, Woolworth Building, New York, N. Y.

POSITION WANTED

POSITION WANTED — Young man, at present in charge of locomotive and car department of railroad in Latin-America desires change. No objection to foreign service. Address Box 193, Railway Age, Woolworth Building, New York, N. Y.

POSITION OPEN

SALES-ENGINEER wanted for progressive, national construction engineering company, must be acquainted with R.R. organizations and executives, familiar with construction engineering, and cater to R.R. for construction of buildings; strong, forceful and aggressive sales engineering type with above requisites; write Dept. S., R. T. Fennell & Associates, Inc., Park Bldg., Pittsburgh, Pa.

POSITION OPEN

WANTED—A young Electrical Engineer with some railroad experience for editorial work. State experience and salary expected. Box 131, Railway Age, Woolworth Building, New York, N. Y.

IF ACTUALLY QUALIFIED for salary between $2,500 and $25,000 communicate with undersigned, who will negotiate strictly confidential preliminaries for such positions; executive, administrative, technical, professional; all lines. Not an employment agency, undersigned acts in direct confidential capacity, not jeopardizing present connections. Established 1910. Send name and address only for explanatory details. R. W. Bixby, Inc., 302 Lockwood Bldg., Buffalo, N. Y.

POSITION OPEN

AIR Brake Mechanic for large corporation in South America must be first class man, single, under 40 years of age, must stand rigid physical examination. Plant located at an altitude of 10,000 feet. Three year contract, salary $225.00 per month, transportation both ways and salary while traveling paid by company, 2 weeks' vacation every six months. Excellent opportunity for right man. M. K., Room 226, 206 Broadway, N. Y. City.

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SEND for Free Special Bulletin and learn how to increase your knowledge of practical railroad work and fit yourself for promotion. The Railway Educational Bureau, Omaha, Nebr.

FOR SALE

Three 21x30 Baldwin Consolidation Locomotives, weight 89 tons, 185 lbs. steam pressure.
Two 18x24 Brooks 10-Wheelers, weight 60 tons, 160 lbs. steam pressure.
Three 18x24 Brooks 6-Wheel shifters, weight 50 tons; 160 lbs. steam pressure.
One 17x24 4-Wheel shifter; weight 40 tons; 160 lbs. pressure.
All thoroughly overhauled in our shops here before shipment.

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Birmingham, Alabama

Railroad Ties for Sale!

I own a solid body of timber—mostly Maple, Birch and Cedar—which will produce between 8,000,000 and 10,000,000 standard Railroad ties.

Timber is located close to a deep, land-locked harbor—the best on Lake Superior — from which it can be shipped to all points on the Great Lakes. Prices and terms reasonable.

JOHN C. SPRY
Owner of Timber Properties.
1003 Harris Trust Bldg., Chicago

FREIGHT CARS

2 ALL STEEL, 40 TON, HIGH SIDE, FLAT BOTTOM, GONDOLA CARS.

Inside Length	36' 0"
Inside Width	9' 8¾"
Inside Height	4' 0"

Prices Furnished on Application.
YOUNGSTOWN STEEL CAR COMPANY, Niles, Ohio.

Immediate shipment 2,000 tons 90-lb. relaying rail located Dayton, Ohio; also 2 large freight locomotives in first class condition.

M. K. FRANK
Frick Bldg., Pittsburgh, Pa.

FREIGHT CARS

6 ALL STEEL, 50 TON, LOW SIDE, GONDOLA CARS.

Inside Length	42' 9½"
Inside Width	9' 7"
Inside Height	2' 0"

Prices Furnished on Application.
YOUNGSTOWN STEEL CAR COMPANY, Niles, Ohio.

Dealers in Track Material

TRACK SPECIALTIES CO.
29 Broadway, New York

FOR SALE
RAILWAY EQUIPMENT
Correspondence Solicited
THE MALES CO.
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Tourist Cars

Twelve 56-ft., 14-section, wide vestibuled tourist sleeping cars. Steel platforms.

Do you wish details?

E. H. WILSON & COMPANY
Commercial Trust Building,
PHILADELPHIA

New and Relaying Rails

HYMAN-MICHAELS CO.
531 Peoples Gas Bldg., Chicago

Branch Offices:
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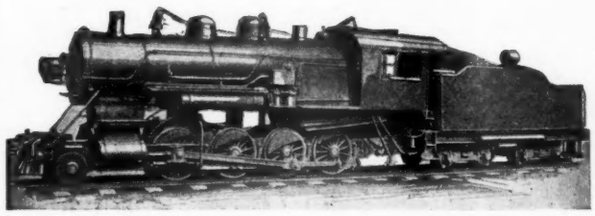
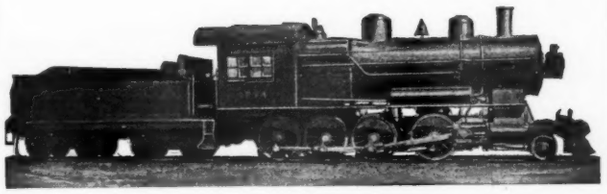


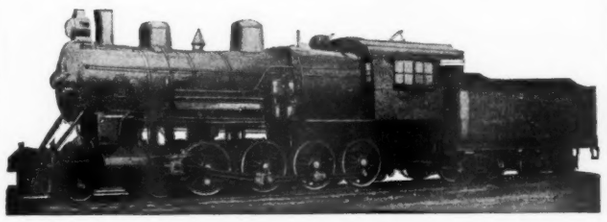
1580 CLASS

Have eight, 92 tons, cylinders 21 x 28″, Piston Valves, 200 pounds pressure.



201 CLASS

Have four, 83 tons, cylinders 20 x 26″, Piston Valves, 200 pounds pressure.



1472 CLASS

Have six, 79 tons, cylinders 20 x 26″, Piston Valves, 200 pounds pressure.

Can make immediate delivery of either class offered above, and if interested telegraph us and will mail complete specifications, photographs and prices.

Also have other locomotives narrow and standard gauge, various types. Have in stock steam shovels 1¼ to 4 yard dippers.

SOUTHERN IRON & EQUIPMENT CO.

Atlanta, Georgia

Established 1889—Incorporated 1906

General Offices and Plant Atlanta, Ga.

Branch Offices New Orleans, La.

LOCOMOTIVES

1—Brooks Mogul, 36″ ga., cyl., 15x22, No. drivers 6, weight 66,500#.
3—Brooks Cons., 36″ ga., cyl., 16x20, No. drivers 8, weight 85,000#.
1—Shay Geared, 36″ ga., 3 cyl., 12x12, No. drivers 6, weight 79,500#.
3—Shay Geared, 24″ ga., 3 cyl., 8x8, weight 48,000#.
1—Davenport Saddletank, 36″ ga., No. drivers 4, weight 38,000#.

COACHES

4—Passenger Coaches, 36″ ga., length 45′ 6″.
2—Passenger Coaches, 36″ ga., length 49′ 0″.
1—Combination Car, 36″ ga., length 45′ 6″.
1—Baggage, 36″ ga., length 32′ 0″.
2—Cabooses, 36″ ga., length 23′ 0″.

CARS

15—Box Cars, 36″ ga., 40,000#, cap, length 32′ 0″.
14—Flat Cars, 36″ ga., 40,000#, cap, length 32′ 0″.
13—Flat Cars, 36″ ga., 30,000#, cap, length 28′ 0″.
10—Gondolas, 36″ ga., 40,000#, cap, length 32′ 0″.
1—Modern Cook Car, 36″ ga., length 28′ 0″.
1—Box Car, fitted for kitchen, 36″ ga.
1—Water Tank Car, 36″ ga., cap, 5,400 gals.
1—36″ ga., wrecking crane, 7x10 Hoist, length of boom 30′ 0″.
1—McKeen Gasoline Motor Car, Std. gauge, 200 h.p.
1—Passenger Gasoline Car, 36″ ga., 4 cyl., engine.
8—Hand and Push Cars.

RAILS

700-ton 56# Rail.
1,800-ton 50# Rail.
500-ton 40# Rail.

THE MORSE BROS. MACHINERY SUPPLY COMPANY

DENVER **COLO.**

FOR SALE

Axle Lathe built by the Niles Tool Works at Hamilton, Ohio. It was installed about 1888 and was taken out of service in 1910. This machine is belt driven, three speed with counter shaft, in good condtion.

Capacity of machine 5½ by 10 axle. This lathe was taken out of service because the shops were later equipped with a larger motor driven machine. They have no factory or serial number on them.

One car wheel boring mill: This built by the Niles Tool Works at Hamilton, Ohio, and installed new about 1888. Removed from service in 1910 account of procuring a larger model machine. This machine is belt driven, three speed and three feeds that are procured from a three step counter shaft which is in good condition. Is equipped with a screw hoist for pulling the wheels in the machine. This boring mill will handle up to and including a 36″ wheel. The boring bar is non-adjustable. No serial or factory number.

Any interested should address me here, 1756 Railway Exchange Building, St. Louis, Mo.

The statement attributed to Mr. F. E. Pettengill, Freight Claim Agent of the Boston & Albany Railroad Company, which appeared in our advertisement in the Railway Age of November 26, 1920, thru an error on the part of our Advertising Department, was published without specific authority from Mr. Pettengill. We wish to take this opportunity of apologizing for our error in publishing a statement of this kind without full approval of the officers of the railroad company.

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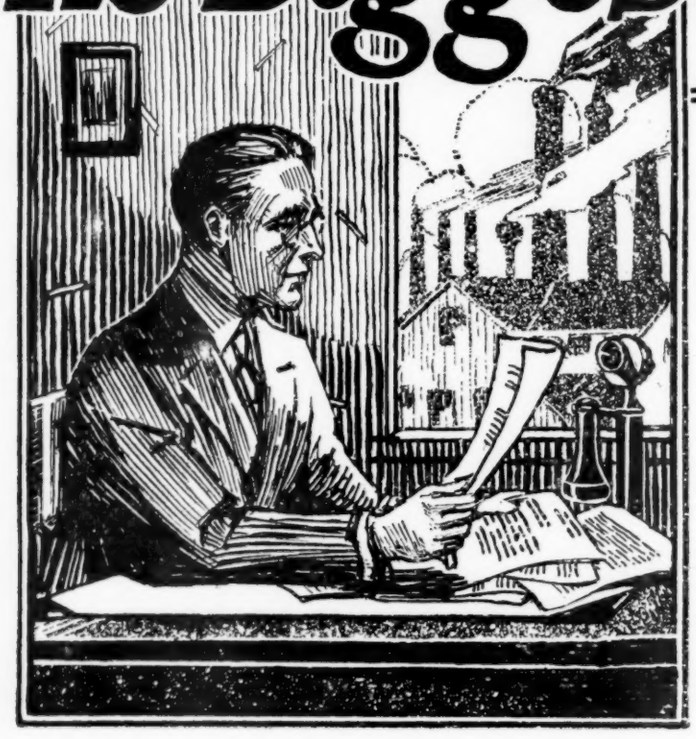
Woolworth Bldg. New York City
Offices in Principal Cities

Advertisements appearing in Railway Age are read by the men who authorize and make purchases for American railways.

A Quality That Satisf
The Biggest Manufact



FOUR years ago, when it was necessary for the War Department to go into the open markets and purchase materials at unheard of prices; when emergencies required the entire output of enormous factories; when business first experienced the real meaning of "PRIORITY" it was common knowledge that quality was the first factor to be considered.

The exact meaning of "Made to Government Specifications" then became common knowledge.

Later, when the property was declared surplus and War Department Sales were instituted, the interests closely related to war-time production were quick to appreciate the significance behind its disposal. The awards made prove this. Equally gratifying and proving beyond all doubt that the entire buying power of America appreciated the wonderful opportunities afforded, is the fact that manufacturers only remotely associated with war-time production were equally as quick to buy. The commonly known quality and value of War Department Properties promoted this buying and is every day adding to the staggering total of sales. Study the items displayed here; they are rich in opportunities. Follow War Department advertising as you would the offerings of the world's greatest and most economical source of supply because that is just what War Department Surplus Property Sales are.

Equal opportunity awaits all business, large and small.

Surplus Property Branch,
OFFICE OF THE QUARTERMASTER GENERAL,
WAR DEPARTMENT,
Munitions Building, Washington, D. C.

WAR DE
"Surplus Pro

asfies
facturers

The following are a few of the items obtainable from the War Department in just this one sale.

The coupon below will, when sent in, provide you with a complete list with detailed specifications of all equipment and materials offered on M. & E. M. List No. 11.

Whitcomb Blaisdell Planers
Saw Filing Outfit
Vert. Punching Machines
Grindstone Frames
Nut Facing Machine
Filing Machine
W. E. Co. Filters
Callimeters
Engr. Rect. Protractors
No. 2½ Bits
Driving Gears
Spare Parts
Woven Wire
Oscillating Sanders
Sanders, Yates
Circular Saws
Engine Parts
No. 3 Kempsmith Millers
Starring Machines No. 9370.
Cinn. Shaper
16 in. B. G. Shaper, No Motor
100 Ton Hydraulic Press
Core Hammer "A" Parts
16 in. Teeth Saws
Flue Welding Furnaces
Minster Machine Tool
Tempering Tanks
Shelving Units
Axle Lathe and Motor
Edger and Shaper, comb.
Switches
Searchlight Cable Reels
Galvanometer
Base Plugs
Parts for 15 H.P. Motors
Lightning Arresters
Controllers and Parts
Cut-in Stations
3 H.P., 230 V., Starting Boxes
Panels, W. E. No. 143316 Spec.
Switchboards, 4-line mono.
Jack Wedges with Cord
Tel. Switch Wedges
Buzzer Connectors
Starting Rheostats
Misc. Tel. Equip.
W. E. A. S. A. Signal Groups
¾" Friction Tape
Cords W. E. No. 348
Circuit Detectors
Pump Tools and Parts
Pump Valves
Misc. Materials
Parts for Pneumatic Hammers
Electric Exploders
Detonating Cord
Cloth Testing Machines
1 Min. Flares
Blasting Caps
Fuse, Bickford
Exploders
Nail Conveyor System
Madden Truck Layers
25,000 Gal. Wood Tanks
Auto Call System
50 H.P. Gas Engine
Fixtures for Water Tanks
Zincographic Chests
Brown Incline Pilers
Chain Conveyor
Spring Jacks
½ in. Brass Globe Valves
Power Testing Meter
Cases for Wrist Watches
Tool Steel
Angle Posts
Expanded Metal
Steel Channels
Trench Shelters
One-half in. Black Steel Pipe
C. H. Soft Steel Bars
Channel Clamps
Fiber Boards
Knapsack Springs
Sheet Steel Misc.
Heel Plates
Expanded Metal Sheets
Nipples
Check Valves
Connectors, Brass
Galv. Steel Hose Clamps
Water Hose
Suction Sleeves, Galv.
Globe Valves, Brass
8 in. Flange Valves
Misc. Pipe Fittings
Barrel Cocks
Brass Compression Cocks
Brass Stop Cocks
Compression Brass Finish Cocks
Foot Valves and Strainers
Kunkle Burner Oil Tanks
Laundry Machinery
Washing Machines
Laundry Body-Ironers
Laundry Sleeve-Ironers

This sale will be conducted by negotiation through the various Depot Quartermasters from whom information may be had upon application from time to time.

New York,
59th St. & 1st Ave.,

Brooklyn, N. Y.

Chicago, Ill.,
1819 West 39th St.

Boston, Mass.,
Army Supply Base.

Atlanta, Ga.
Transportation Bldg.

San Francisco, Calif.,
Fort Mason.

San Antonio, Texas,

San Antonio.

(COUPON)

Chief, Sales Promotion Section,
Office of the Director of Sales,
Dept. J-11, Room 2515, Munitions Bldg.,
Washington, D. C.

Kindly send Bulletin on Materials and Equipment offered in M. & E. M. List No. 11 to:

Firm Name.....

Street Address.....

City .....State .....

Signed by .....

EPARTMENT
pperty Sales"

The List of Purchasers from War Department Sales Reads Like a Blue Book of America's Biggest Business Interests

Nearly one hundred thousand individual orders representing sales amounting to nine hundred million dollars is the staggering total of property disposed of through War Department sales to date.

The buying power of America has responded to these sales in a big way, many purchasing departments looking to them as a regular source of supply.

Manufacturers have bought, dealers have bought; the smaller interests have purchased in small lots, the larger business and industrial firms have bought heavily.

Thousands of machines purchased through this channel are in operation. Thousands of motors, generators, and other electrical equipment are supplying heat, light and power in every industry. Huge quantities of chemicals have found their way to use through these sales. Thousands of tons of iron and steel from this source have been wrought into every conceivable tool and commodity. Millions of dollars' worth of high-grade wanted materials, supplies, etc., and equipment of every description has reached the consumer's market through regular re-sale channels.

As long as War Department stocks last, opportunities are many.

As a unit of the buying power of America, it is to your advantage to follow every War Department offering. Others have benefited. Why not you?

SURPLUS PROPERTY BRANCH
Office of Quartermaster General
Munitions Building, Washington, D. C.

ADDITIONAL ITEMS
from
MACHINERY AND ENGINEERING MATERIALS
LIST NO. 13

To Be Sold by Negotiation

Aneriod Barometers
Canister Bottoms
Compass Boxes
Ratchet Braces
Brass Grommets
Brass Fasteners
Brass Hock Parts
Brass Loops
Brass Rivets
Brass Slides
Brass Studs
Brass Washers
Load Covered Cable
Telephone Cable
Cable Releases
Calipers
Canvas, O. D.
Concrete Push Carts
Compass Watches
Condensers
Reducer Connections
Conveyors
Cylinders
Duck, O. D.
Dynamite
Steam Engines
Gas Mask Eye Lenses
T. N. T. Cylindrical
Trench Fans
Flashlights
Fuses
Fuse Dust

Generator Sets
Riveting Hammers
Chain Hoists
Air Hose
Suction Hose
Expansion Joints
Electric Knives
Metal Forming Machines
Machine Check Writers
Motors
Canister Nozzles
Oil for Break Switches
Loom Oil
Lard Oil
Quenching & Tempering Oil
Pipe Fittings
Nipples
Malleable Pipe
Sewer Pipe
Signal Plugs
Galvanized Bit Plugs
Steel Springs
Structural Steel Shapes
Switch Boards
Rubber Tape
Canister Tops
Tripods for Heliographs
Wrist Watches
Differential Cap Pulleys
Resonators
English Screws
Shanks for Indicator Posts

Steel
Bar Steel
I-Beams
Structural Steel
Screw Posts
Galvanized Rods
Crucible Tool Steel
Steel Hoops
Strip Steel
Tool Steel
Air Tanks
Galvanized Iron Tanks
Vertical Tubular Boilers
Level Books
Plant Construction Books
Logging Carts
Beaded Edge Casings
Zincographic Chests
Chief Operator's Desks
Drawing Boards
Motor Fuses
Meat Grinders
Knife Grinding Machines
Gum Box Board
Hob Nails
Engine Lathes
Motors for Grinders
B. T. Boilers
Cavalry Plastrons
Boiling Plates
Screw Plates
Stocks & Dies

Coupling Poles
Payout Reels
Relay Racks
Hand Rip Saws
Spare Parts for Steam Engines
Buffalo Shears
Flagstaffs
Film Tanks
Storage Tanks
Winches
Boilers and Covers
Hoisting Engines
Concrete Mixers
Oil Reclamation Plants
Wire Firing Reels
Unions
Galvanized Iron Wire
Anti-Dimming Outfits
Very Pistol Shells
Bicarbonate of Sodium
Sulphur
Rubber Outlet Valves
Expanded Metal Sheets
Cement Glue
Litharge
Respirators, Horse
Warning Signals, Gas
Trench Sprayers
Rubber Tubing
Wire Outlet Valves
Horseshoe Nails

WAR DEPA

"Surplus Prope

Every Item of Pertinent Interest

EASTERN DIVISION

14714
880 tons Barbed Wire, black.
Location—Schenectady, N. Y.

19857
206 reels Barbed Wire, 4 point.
Location—Washington, D. C.

20249
125,300 lbs. Barbed Wire, B. & S. No. 10.
Location—Washington, D. C.

20129
937,458 lbs. Barbed Wire, painted black.
Location—New Cumberland, Pa.

3484
194,671 lbs. Copper Wire, hard drawn tinned No. 14, B. & S. tw. pi. 3/64 R. S. B. W. P.
Location—Schenectady, N. Y.

E-1251
53,298 lbs. plain Copper Wire, hard drawn steel, No. 7 gauge, low carbon.
Location—Pittsburgh, Pa.

13648
7 rolls Weaving Wire, 1¼ mesh 78″x100′x11 ga.
Location—New Cumberland, Pa.

E-885
150 Heavy Wire Screens, ¾″ mesh, 18″ wide.
Location—Philadelphia, Pa.

E-884
450 Heavy Wire Screens, 1¼″ mesh, 6′3″ wide liga.
Located—Philadelphia, Pa.

16047
2,154 ft. Wrought Iron Black Sewer Pipe, 12″.
Location—Philadelphia, Pa.

13667
41 Shelters, corrugated iron metal arch, 32′x7″. 11 gauge elephant type, "E," complete with parts.
Location—Schenectady, N. Y.

CENTRAL DIVISION

C-67
1 Pile Driver, portable compound, gas, engine and hoist, Class A.
Location—A. R. D., Columbus, Ohio.

2749
2,400 Posts, Angle, 6′x1¾″x1¼″.
Location—A. R. D., Columbus, Ohio.

C-162
3 Tanks, wood stave, redwood, 100,000 gallon. Overall dimension 13′10½″.
Location—Columbus, Ohio.

11913
345 Storage Tanks, steel, vertical, 60″ long, 36″ dia., capacity 300 gallons.
Location—Hawthorne, Ill.

14740
80 lbs. Barbed Wire, painted black, No. 12 gauge.
Location—A. R. D., Columbus, Ohio.

17707
5,153 lbs. Cold Rolled Steel, 2″ round.
Location—Detroit Ordnance Depot.

17684
21,096 lbs. Steel, 2½″ round.
Location—Detroit Ordnance Depot.

83,300 lbs. Steel, 3½″ square.
Location—Detroit Ordnance Depot.

85,618 lbs. Steel, 1¼″, cold rolled, round.
Location—Detroit Ordnance Depot.

MACHINERY AND ENGINEERING MATERIALS

LIST NO. 13

Sold By Negotiation

HOW TO ORDER

All orders and negotiations for materials offered in this list must be addressed to the Depot Quartermaster of the division where material is located. These divisions and the addresses of controlling offices are given below. To obtain a complete list of materials not listed in this advertisement, clip and mail the attached coupon.

LIST OF DIVISIONS AND CONTROLLING OFFICES

Eastern Division
59th St. and 1st Ave.
Brooklyn, N. Y.

Central Division
1819 West 39th St.
Chicago, Ill.

Southern Division
Transportation Bldg.,
Atlanta, Ga.

Southwestern Division
San Antonio, Texas

Northeastern Division
Army Supply Base,
Boston, Mass.

COUPON

Chief, Sales Promotion Section, Office of the Director of Sales, Room 2515, Munitions Building, Washington, D. C.

Important Mail Coupon to This Address.

Kindly send M. & E. M. **List No. 13**

..... in its entirety.

Firm Name.....

Street Address.....

City .....

State .....

Signed by.....

Railway Age

ARTMENT
erty Sales"

44 Decapod Locomotives

Speed Up Your Reconstruction Program

Small Initial Investment—No Delivery Delays

A portion of the unsold remainder of 200 locomotives originally built for Russian service and purchased by the U. S. War Department on the collapse of the Imperial Government.

The heavy service to which they are adapted can be gained from reading the list of prominent railroads who have already purchased one hundred of these locomotives and are now operating them under severe service conditions.

$55,000 Value for $25,000

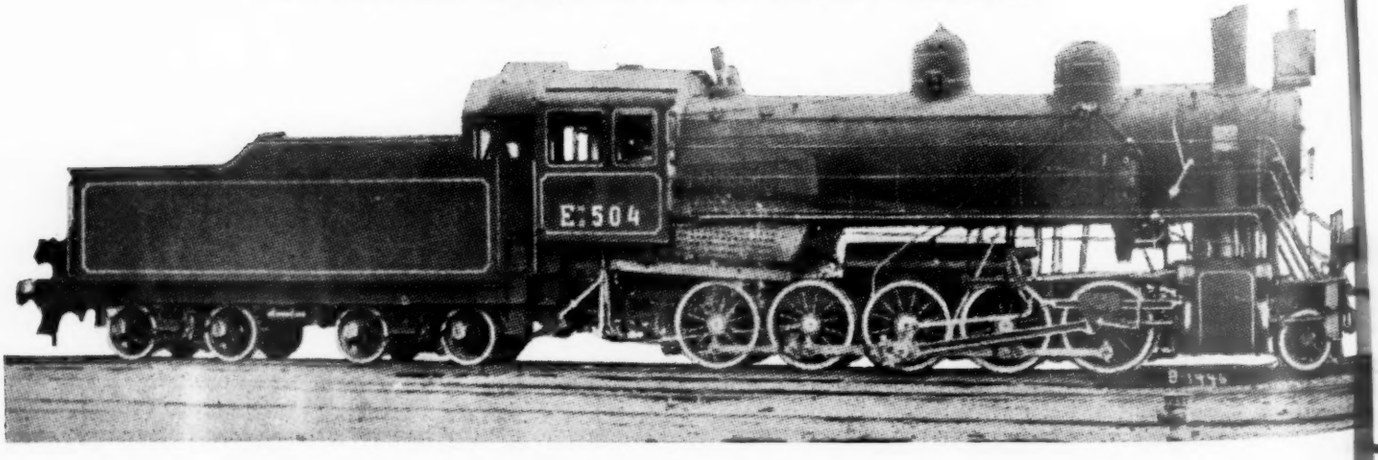
Payable in Ten Yearly Installments

Those entrusted with the purchase of railroad rolling stock under present conditions will find in this offer two distinct buying appeals. No delivery delay to hold up your reconstruction program. A selling plan that involves but a small initial investment. One tenth the selling price on delivery; the balance in nine yearly payments with interest at 6%.

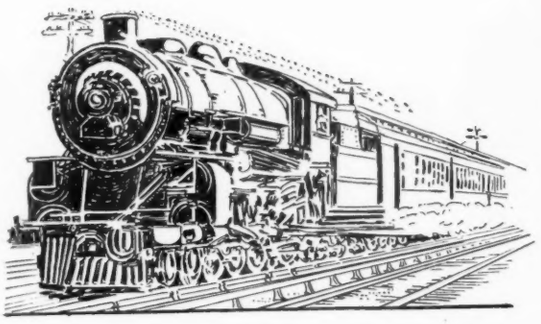
This represents such an exceptional opportunity that we strongly advise an early decision from interested companies.

All have been altered to operate on standard gauge track. A number are in good condition and ready for immediate service. The balance require only minor repairs.

To Be Sold Only to American Railroads



immediate delivery



One Hundred Have Been Purchased and Are Now Doing Duty on the following railroads:

Atlantic Coast Line	N. O. T. & M Ry.
Seaboard Air Line	St. Louis & H. Ry.
P. & R.	C. & W. C.
Western Maryland	N. C. & St. L.
St. L. & S. F.	W. F. R. & F. W. and D. T. & I. R. R.'s

SALE CONDITIONS

TO BE SOLD at the fixed price of $25,000 each, a decided reduction from the original selling price, and payable in ten easy annual installments, with 6% interest on deferred payments.

LOCATION

Tullytown Arsenal,
Tullytown, Pennsylvania

For further particulars address:

CHIEF OF ENGINEERS

Room 2828
Munitions Building
WASHINGTON, D. C.

SPECIFICATIONS

Cylinders, Simple 25″ x 28″.
Fuel, Soft Coal.
Drivers, Diameter, 52 inches.
Working Pressure, 180 lbs.
Heating Surface (approximate) Fire Box 194 sq. ft.
Fire Brick Tubes, 24 sq. ft.
$5\frac{3}{8}$″ Tubes
2″ Tubes } 2,382 ft.
Heating Surface, Total 2,600 sq. ft.
Grate Area, 61.6 ft. Ratio Heat Surf. 1 to 40.
Superheating Surface, 563 sq. ft.
Wheel Base, Driving, 18 ft. 8 in.
Wheel Base, Total Engine, 27 ft. 10 in.
Wheel Base, Engine and Tender, about 60 ft. 1 in.
Weight in Working Order (Approximate)
On Drivers, 176,300′
On F. Truck, 26,200′
Total Engine, 202,500′
Tender, 132,000′
Special Equipment—Schmidt Superheater.
Tractive Power, 51,600 lbs. Ratio of Adhesion, 3.43.
Water Capacity, 7,400 U. S. Gals. Fuel Cap., 8 Metric Tons.

U.S.
CORPS OF ENGINEERS

DIRECTORY OF ENGINEERS

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
Electrical — Civil — Mechanical

Specialists in the planning of railroad properties and their construction. Offering complete service from conception to operation, eliminating hazardous division of responsibility and insuring maximum economy.

108 South La Salle Street
CHICAGO

Bush, Roberts and Schaefer Co.
Engineers and Contractors
McCormick Bldg., Chicago
No. 1 Madison Ave., New York
Col. Lincoln Bush, E.D., Pres.
Reinforced concrete viaducts track elevation work, railroad terminals, piers, docks, general civil engineering and construction work.

Railway and Industrial Engineers
Incorporated
Investigations, Inventories and Valuations
Specialists in Railway and Industrial Facilities and Equipment
Reports on Contemplated Improvements
25 Broad Street, New York
Cable Address, - - Railindeng

The Watson Engineering Company

Our complete and experienced organization is at your service for the design and construction of railway structures of every character.

Hippodrome Building
CLEVELAND

Charles Evan Fowler
M. Am. Soc. C. E. M. Eng. Inst. Can. Consulting Civil Engineer.
BRIDGES, FOUNDATIONS
Reinforcement of Long Spans a Specialty.
New York City, 25 Church St.

DWIGHT P. ROBINSON & COMPANY
Incorporated
Engineers and Constructors
Consolidated with
Westinghouse, Church, Kerr & Co., Inc.
Railroad Shops & Terminals
Power Plants Electrification
Coaling Stations
125 East 46th St., New York
Chicago Cleveland Pittsburgh Dallas
Youngstown Los Angeles

DAY & ZIMMERMANN
Incorporated
ENGINEERS

Layout, Design and Supervision of Construction of Railroad Shops, Terminal Facilities, Power Plants, Coaling and Watering Stations.

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PHILADELPHIA

2 Wall St. NEW YORK
Harris Trust Bldg. CHICAGO

GULICK-HENDERSON CO.
Inspecting Engineers. Inspection of Bridges. Building Materials, Railway Equipment, Cement, Pipe, Machinery, etc. Examinations, Consultations, Appraisements. Physical and Chemical Laboratories.
General Offices, New York
Pittsburgh, 525-529 Third Ave.
Chicago, Ill., 421 South Dearborn St.
New York, 145 West 36th Street

C. E. SMITH & CO.
Consulting Engineers
2065-75 Railway Exchange, St. Louis, Mo., Chicago, Kansas City.
Investigations, Reports, Appraisals, Expert Testimony, Bridge and Structural Work, Electrification. Grade Crossing Elimination, Foundations, Docks, Water Supply, River and Flood Protection, Drainage and Sanitation, Naval Architecture.

The J. G. White Engineering Corporation
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems.
43 Exchange Place, New York

Pittsburg Testing Laboratory
CHICAGO—PITTSBURGH—NEW YORK
Inspection Rails, Bridges and Buildings and all Railway Supplies
CEMENT testing and inspection at Mills before shipment.
Chemical and Physical Tests.

STONE & WEBSTER
Incorporated
Design and Construct
STEAM POWER STATIONS
WATER POWER DEVELOPMENTS
TRANSMISSION LINES
SUBSTATIONS GAS PLANTS
NEW YORK BOSTON CHICAGO

Robert W. Hunt Jno. J. Cone James C. Hallsted D. W. McNaugher
ROBERT W. HUNT & CO., ENGINEERS
BUREAU OF
INSPECTION TESTS AND CONSULTATION
CHEMICAL AND PHYSICAL TESTS
ESTABLISHED OFFICES IN
CHICAGO NEW YORK PITTSBURGH ST. LOUIS SAN FRANCISCO
SEATTLE LONDON MONTREAL TORONTO VANCOUVER

A card here is a card placed weekly on the desks of nearly every railway official.

The annual meeting of the stockholders of the Aldrich Publishing Company, for the election of directors and such other business as may properly come before the meeting, will be held in the executive offices of the company, 233 Broadway, New York, N. Y., on Monday, January 10, at 12 o'clock noon.

ROY V. WRIGHT,
Secretary

DIXON'S HUB LINER GREASE
prevents wear and cutting of Shoes, Wedges, Hub Liners, etc., because of the graphite veneer imparted by this grease. Write for sample and Circular No. 105-HR.
Made in JERSEY CITY, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
D X N TRADE MARK ESTABLISHED 1827 D X N TRADE MARK

Keith Railway Equipment Company

General Offices:
122 South Michigan Ave.
Chicago

Manufacturers of
Steel Freight Cars

Shops at Hammond, Ind.
Located on B. & O. C. T. R. R., Pennsylvania Line, Wabash Railway, South Shore Electric Line.

We Build Steel Underframes
Steel Freight Cars Repaired and Rebuilt
We Manufacture Tank Cars for Sale or Lease

Prepared to furnish on short notice tank car specialties and repair parts, standard to various types of cars.

STONE FRANKLIN CAR LIGHTING SYSTEM

Reliable, Dependable, Economical, Efficient

Stone Franklin speed controlled generator means satisfactory lighting at all times and increased battery life.

STONE FRANKLIN COMPANY

18 East 41st Street, New York **Transportation Bldg., Montreal**

UFCO UNION FUEL COMPANY

A COMPANY WITH DEFINITE IDEALS

UNITING:
MINES OF ESTABLISHED REPUTATION
COMPACTNESS OF LOCATION
UNEXCELLED TRANSPORTATION
EXPERIENCED SUPERVISION
EFFICIENT SERVICE TO CUSTOMERS

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Lytton Building, Chicago

L. J. PULLIAM, President
ANDREW STEVENSON, V.-Pres.
B. F. BLISS, Auditor

OPERATING and SALES OFFICES
Reisch Building, Springfield, Ill.

L. S. SHORT, Purchasing Agent
G. W. HATCH, Sales Manager
H. E. SMITH, Gen'l Supt.

MINES LOCATED AT

No. 1 Nilwood, Ill.
No. 2 Keys, Ill. (Tuxhorn)
No. 3 Auburn, Ill.
No. 4 Athens, Ill.
No. 5 Selbytown, Ill.
No. 6 Girard, Ill. (Ridge)

GEAR AND FRICTION DRIVEN GASOLINE LOCOMOTIVES—2½ TO 25 TONS ON DRIVE WHEEL

WHITCOMB LOCOMOTIVES

IT WILL PAY YOU TO GET OUR PROPOSITION BEFORE YOU BUY

GEO. D. WHITCOMB CO.

MAIN OFFICE AND WORKS

ROCHELLE, ILLINOIS
U. S. A.

STORAGE BATTERY LOCOMOTIVES—1 TO 8 TONS ON DRIVE WHEELS

OXYGEN AIRCO ACETYLENE

WELDING AND CUTTING APPARATUS AND SUPPLIES
ACETYLENE GENERATORS—NITROGEN—CARBIDE

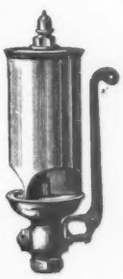
AIR REDUCTION CO., Inc.

AIRCO DISTRIBUTING STATIONS

Albany, N. Y.	Defiance, O.	Kansas City, Mo.	Pittsburgh, Pa.
Atlanta, Ga.	Detroit, Mich.	Lebanon, Pa.	Portland, Ore.
Baltimore, Md.	Duluth, Minn.	Louisville, Ky.	Richmond, Va.
Bethlehem, Pa.	East Chicago, Ind.	Madison, Ill.	San Francisco, Cal.
Boston, Mass.	East St. Louis, Ill.	Milwaukee, Wis.	Seattle, Wash.
Bridgeport, Conn.	Erie, Pa.	Minneapolis, Minn.	Sharon, Pa.
Bronx, N. Y.	Emeryville, Calif.	Nashville, Tenn.	So. Bethlehem, Pa.
Brooklyn, N. Y.	Fort Wayne, Ind.	New Haven, Conn.	Springfield, O.
Buffalo, N. Y.	Gloucester, N. J.	New York City	St. Louis, Mo.
Chicago, Ill.	Grand Rapids, Mich.	Norfolk, Va.	Tacoma, Wash.
Cincinnati, O.	Hartford, Conn.	Oklahoma City, Ok.	Terre Haute, Ind.
Cleveland, O.	Indianapolis, Ind.	Omaha, Neb.	Toledo, O.
Coatesville, Pa.	Jersey City, N. J.	Paterson, N. J.	Tulsa, Okla.
Columbus, O.	Johnstown, Pa.	Peoria, Ill.	Venice, Ill.
Des Moines, Iowa	Joplin, Mo.	Philadelphia, Pa.	Warren, O.
			Youngstown, O.

Crosby Chime Whistle

For Passenger Train Service.



Distinguishes This Service from Freight.
Can Be Heard at a Great Distance.

SUPERIOR TO THE COMMON WHISTLE

Being Harmonious and Agreeable.

Manufactured and Sold by

Crosby Steam Gage & Valve Co.

Boston New York Chicago San Francisco London

3

GRAVER

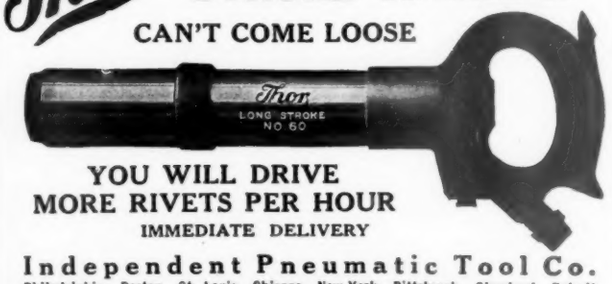
Water Softeners and Filters That Fully Meet Railway Problems, Steel Tanks and Steel Plate Work of All Kinds.

GRAVER CORPORATION

East Chicago, Ind. — Railroad Dept., Steger Bldg., Chicago

Thor ONE PIECE LONG STROKE HAMMER

CAN'T COME LOOSE



YOU WILL DRIVE MORE RIVETS PER HOUR

IMMEDIATE DELIVERY

Independent Pneumatic Tool Co.

Philadelphia Boston St. Louis Chicago New York Pittsburgh Cleveland Detroit San Francisco Montreal Toronto Birmingham

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Leave nothing to chance—use

More-Jones Engine Brasses

Our locomotive wearing parts can safely be depended upon to give exceptionally long and satisfactory service.

Write for information and prices.

More-Jones Brass & Metal Company

St. Louis, U. S. A.

(3)

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Charles C. Castle, First Vice President — W. C. Lincoln, Mgr. Sales & Engineering
Harold A. Hegeman, Vice Pres. and Treas. — Fred C. J. Dell, Secretary

National Railway Appliance Co.

50 East 42nd St., New York City

HEGEMAN-CASTLE CORPORATION, 343 So. Dearborn St., Chicago, Ill.
NATIONAL RAILWAY APPLIANCE CO, Munsey Bldg., Washington, D. C.
NATIONAL RAILWAY APPLIANCE CO., Little Bldg, Boston, Mass.

RAILWAY SUPPLIES

- Tool Steel Gears and Pinions
- Anderson Slack Adjusters
- Genesco Paint Oils
- Clapp's Fire Resisting Paint
- Dunham Hopper Door Device
- Feasible Drop Brake Staffs
- Flaxlinum Insulation
- Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner
- Johnson Fare Boxes
- Drew Line Material and Railway Specialties
- Perry Side Bearings
- Miller Trolley Shoes
- Hartman Centering Center Plates
- Economy Power Saving Meter
- H and W Electric Heaters
- Garland Ventilators
- Pitt Sanders
- National Safety Car Equipment Co.'s One-Man Safety Cars

SPECIALISTS

IN THE

Design and Manufacture

OF

Standard Insulated Compromise

Rail Joints

THE RAIL JOINT COMPANY

61 Broadway, New York City

BOOTH LIME-SODA WATER SOFTENER

Banishes Boiler Scale Trouble and Expense

"The 100% Efficient System"

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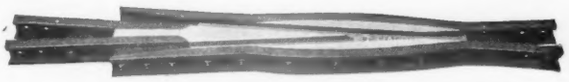

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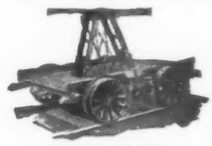
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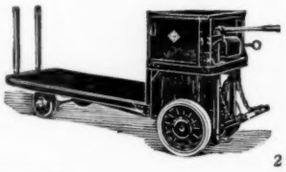

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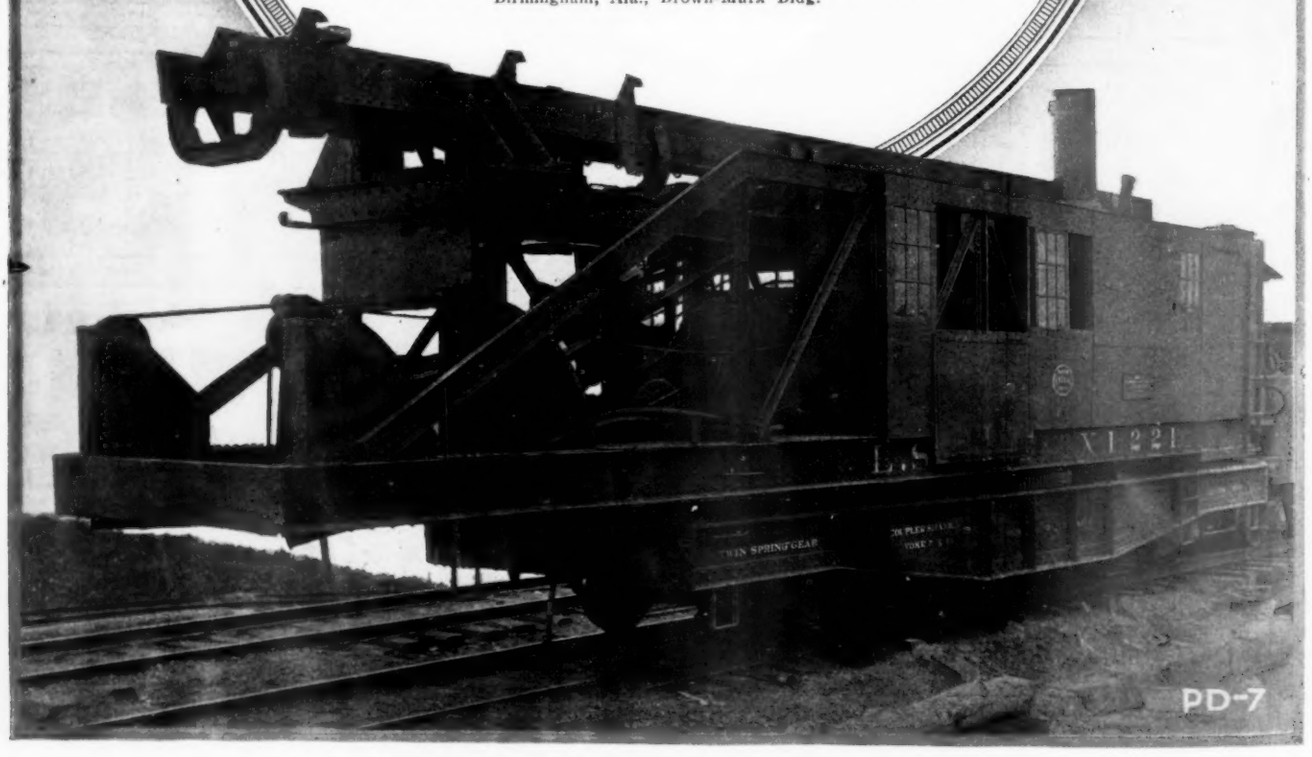

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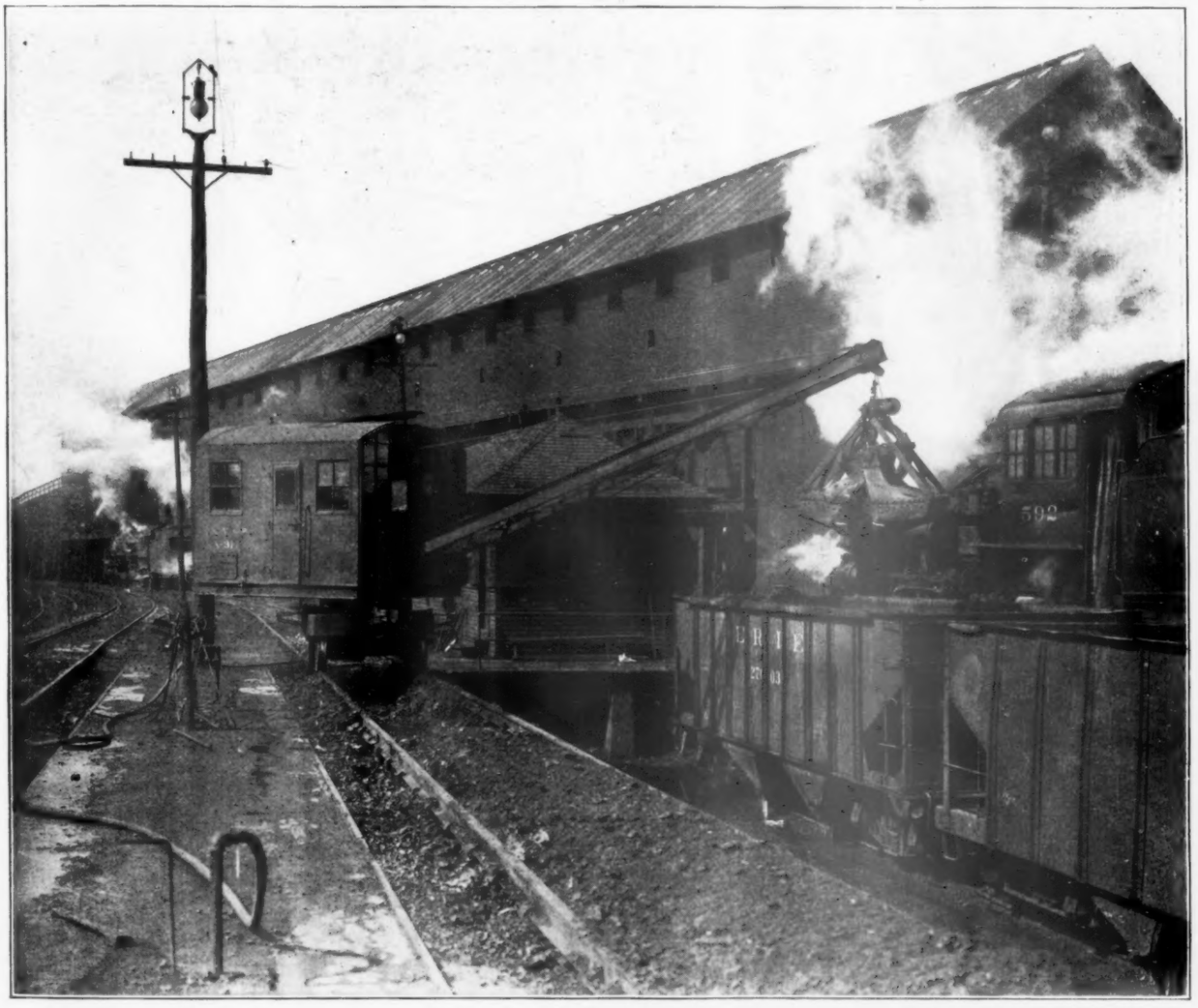

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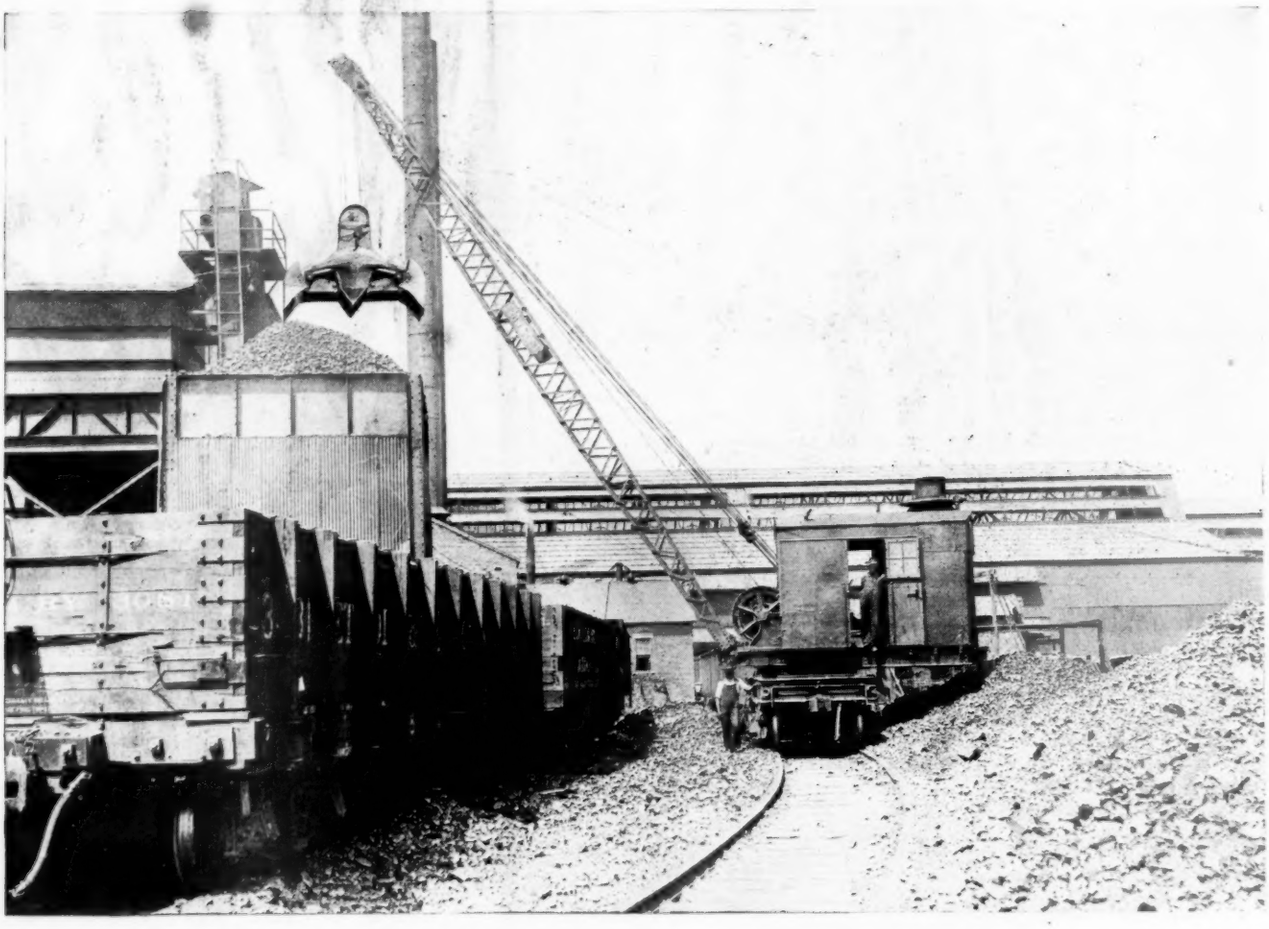

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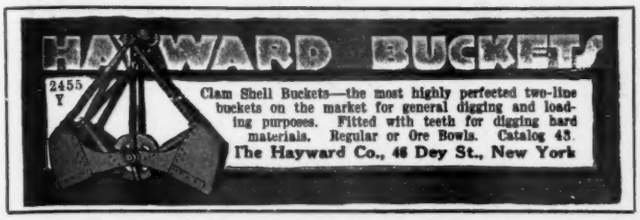
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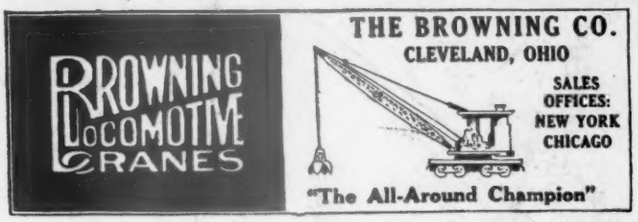

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